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THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Environmental Training Modules Module 2 Shipyard Craft Specific Training

U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

in cooperation with
National Steel and Shipbuilding Company
San Diego, California

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Environmental Training Modules

Module 2

Shipyard Craft Specific Training

Prepared by:

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NSRP 0542
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TRAINING MODULES OVERVIEW

Executive Summary and User s Guide (NSRP 0540) Gives an overview of the 10 module set of environmental training modules, plus key issues involved in training in general. Instructions are supplied for how the modules can be modified to suit individual shipyards, as well as hardware and software requirements.

Module 1 (NSRP 0541) Good Environmental Practices

Content: Craft/trade-specific training on items that workers must deal with on a regular basis – material handling, labeling, waste generation/minimization, requirements awareness.

Recipients: New employees on arrival, and existing workers as a refresher.

Module 2 (NSRP 0542) Environmental Practices for Specific Craft/Trade Groups

Content: Specific training on air, hazardous materials, waste minimization, and related environmental considerations, with a focus on the generator personnel and their individual practices and procedures. Emphasis on those personnel likely to encounter a high incidence of problems during their regular duties.

Recipients: Specific craft/trade groups of workers.

Module 3 (NSRP 0543) Shipyard Incident Response Training

Content: Detailed presentation of response requirements specified by OSHA. Basic ingredients of a viable program for a shipyard – what is required and how to reach a satisfactory state of readiness. Includes specific duties of all participants, as well as how to ensure coordination and a common focus. This Module will provide the shipyards with an in-house capability for conducting this important training.

Recipients: Environmental Manager, Environmental Staff Personnel, Safety Engineer, Safety Personnel, Fire Department Personnel, Laboratory Staff and Technicians, Emergency Response Coordinator, Medical Personnel.

Module 4 (NSRP 0544) Shipyard Oil Pollution Prevention and PIC Training

Content: Provides a detailed overview on the federal regulatory oil pollution prevention and response requirements. Also contains specific training material for those shipyard employees with designated “Person in Charge” responsibilities.

Recipients: Ship and Craft Managers and Leadmen, Environmental and Safety Department Personnel, designated Persons in Charge.

Module 5 (NSRP 0545) General Environmental Awareness

Content: Overview of environmental statutes and regulations affecting shipyards, including responsibilities for compliance including both civil and criminal penalties for non-compliance. Includes an overview and explanation of environmental processes - how laws are formulated, the role of environmental groups, consultants, advisers.

Recipients: Senior Management

Module 6 (NSRP 0546) Technical Overview of Environmental Statutes and Regulations

Content: A general but in-depth overview of all environmental statutes and regulations with a focus on shipyard interests, and emphasis on the technical aspects of the requirements.

Recipients: Environmental Managers and staff personnel.

Module 7 (NSRP 0547) Environmental Requirements of Concern to Shipyards

Content: General overview of ALL requirements as they apply to shipyards. Emphasis on technical aspects and actions needed for compliance, rather than on the penalties for non-compliance. Includes overall strategy for developing a strong environmental posture.

Recipients: Senior Management, Supervisors, Generator Personnel; all workers who interface with environmental matters.

Module 8 (NSRP 0548) Generation/Treatment/Minimization of Hazardous Waste

Content: Discussion of regulatory requirements and statutes that apply to shipyard hazardous waste activities. Stresses the high points of the laws, and how to satisfy them. Includes overview of training provided to hazardous waste operators.

Recipients: Middle-level Managers

Module 9 (NSRP 0549) Hazardous Waste Operator Training

Content: Detailed training on practices and procedures performed by hazardous waste operators. Includes reclamation techniques, safe handling practices, labeling/markings, inventory control, hazard minimization.

Recipients: Hazardous Waste Operators; helpers and assistants

Module 10 (NSRP 0550) Environmental Training for Subcontractor Personnel

Content: Briefing on environmental requirements and considerations applicable to all Subcontractor Personnel entering a shipyard environment.

Recipients: Subcontractor Personnel; visitors to a shipyard; transient personnel such as delivery agents, auditors, and oversight personnel.

Module 1 and Module 2

Good Environmental Practice Sessions

Introduction:

Module 1 (NSRP 0541) and Module 2 (NSRP 0542) are designed to provide environmental awareness training to shipyard employees on various specific and general subjects ranging from air quality to hazardous waste management. The modules are divided into “sessions” called “Good Environmental Practices” (GEPs). The training package contains slides, instructor notes, and student handouts for each GEP training session. The training sessions are indexed into the following 8 directory files: General, Air, Water, Hazardous Materials and Waste (Haz-Cord), Oil and Bulk Fuel Transfer (Oil-Tran), Department of Transportation Regulations for Hazardous Materials Transportation (DOT), Paint, and Preventive Maintenance (PM).

Module 1 focuses on introductory environmental practices that are universal in nature and appeal to a diverse classroom of shipyard crafts. Module 1 is contained in the directory labeled “General”. The GEPs are intended to provide the basis or foundation of understanding about key environmental issues in the shipyard. On the other hand, Module 2 Sessions are intended to reiterate, reinforce and extend upon subjects encountered in Module 1. Module 2 has a more comprehensive scope, in that a larger number of subjects are discussed that potentially pertain to a wide variety of shipyard crafts.

Scope of Module 1

Module 1 contains 18 GEP training sessions that span nearly all shipyard environmental areas of concern. The sessions touch on key issues in a general nature to provide an introduction to Good Environmental Practices to workers that have no environmental awareness training and/or new employees in shipyard. Included in this module is an introduction to federal environmental laws and regulations that affect shipyard operations the most.

Module 1 contains approximately 40 slides on 17 main GEP subjects plus the environmental law introduction. The files are located in the “General” directory. For the presentation, each slide should take between 4 and 6 minutes to present. Therefore, the entire sessions should take between 3 and 4 hours if all of the slides are presented to the class.

Modifying Module 1

Module 1 (NSRP 0541) is essentially a package of GEP sessions that have been selected as “introductory” for the purpose of entry level environmental training. Some shipyards may decide that all of the GEP sessions in Module 1 contain too much information to be given to entry level employees during orientation. If this is the case, the shipyard can simply go through the GEP sessions and identify the subjects that they would like to present (e.g., 8 Modified GEP sessions, 1 hr. orientation).

Scope of Module 2

Module 2 (NSRP 0542) “Craft Specific GEPs” includes over 85 training sessions on various environmental subject matters. Each GEP training session has an employee handout, overheads, and instructor’s notes. The GEP sessions provide specific training on air quality

issues, water quality issues, hazardous waste concerns, waste minimization, transportation of hazardous materials (DOT), bulk hazardous materials transfer (USCG), and a number of other topics. The craft specific practices are arranged in a manner to facilitate customized Good Environmental Practices training programs for a variety of shipyard workers. The GEPs are written in a manner to illustrate the problems that may be encountered and to identify practices that, when applied correctly, can minimize the potential for hazardous spills, chemical related accidents, and environmental harm.

Applying Module 1 and 2 GEP Sessions: Creating Training Programs

Shipyards throughout the nation have different approaches and philosophies towards performing environmental awareness training. Training in specific shipyards must integrate with existing programs and fit into the current training organization. Module 1 and 2 are designed and organized in such a manner to enable shipyards to customize GEP sessions for various crafts and training groups. Therefore, Module 1 and 2 GEP sessions provide a flexible approach for shipyards to address environmental training.

The purpose of the training session flexibility is to enable the individual shipyards to create customized training programs for shipyard crafts (groups). No shipyard has the same set of shipyard crafts, departments, and worker organizations. Different craft groups have varying sets of responsibilities and work functions. The responsibilities and functions of each of the craft work groups, and how they interact with environmental concerns, is the main driver behind what type of GEP training is needed.

The Modules 1 and 2 contain over 100 GEP sessions that can be assembled together and presented in a variety of ways.

Each shipyard will need to identify their training groups by functions and responsibilities. These groupings will vary depending on the shipyard's approach to environmental compliance management and GEP training. One approach is to identify persons in the shipyard responsible for hazardous waste in their area and create a training program specifically for these individuals. This approach could result in a training program called "Hazardous Waste Coordinators" or "Hazardous Materials Coordinators". The shipyard could also use a similar approach that creates a training program for all persons in a particular craft. For example, all individuals from a particular craft would receive training (i.e. "Paint Craft Environmental Training" or "Maintenance Craft Environmental Training"). As another option, the shipyard may use a combination of the previous two approaches for addressing the environmental awareness training needs in their organization because of the various responsibility levels and regulatory requirements. The method chosen will be driven by the shipyard management structure and the shipyard's overall philosophy towards environmental training.

Other Training Approaches Utilizing Module 1 and 2 GEPs

The GEPs can be applied to the shipyard and provided to employees through a variety of mechanisms. The GEPs are structured in such a manner to allow for a short presentation approach. For example, shipyards could present information from the GEPs at "Gang Box" Meetings on a daily basis. The GEP information could also be posted as "Environmental Grams" to be read by employees. Similarly, articles in the shipyard newsletter could be

tailored after selected GEP sessions. The key is to continually inform the employees about environmental awareness issues and the shipyard's commitment to environmental compliance.

Example Good Environmental Practice Matrix Program

An example GEP training matrix has been assembled to illustrate the development of Craft Specific Training Programs. On the horizontal axis, the matrix identifies several Departments, Crafts, and Work Groups in the shipyard that need environmental awareness training. Similarly, on the vertical axis, the nearly 100 GEPs are listed. Example "X's" have been assigned to GEP sessions that apply to the work groups. All of the GEP Sessions marked for a particular group would consist of a training program for that group. Each shipyard will want to develop a similar matrix to develop Craft Specific Training Programs.

GEP Sessions are Designed for Shipyard Modification

The training manual GEPs identify many practices and procedures that are considered "Good". The text in many cases also identifies what employees "should or could do." The shipyard may want to go in to the document and state "will do" to institute a shipyard good environmental policy. Many shipyards may not want to institute these practices in their shipyard for a variety of reasons. All training materials are available to download in their original Word and Powerpoint formats. Shipyards will usually want to modify the GEP Sessions to fit their specific environmental policies and add state requirements as needed.

Modification	Purpose for Modification
Change Text	Add policy and procedure statements and references; remove statements that do not apply; increase scope of GEPs
Add Shipyard Specific Photos	Add photos from specific shipyard areas to be used in the overheads.
Add Graphics	Add the company logo and other graphics to the training overheads and student handouts.
Customize Instructor Notes	Customize the instructor's notes to help with shipyard specific anecdotes and situations.
Change Slide Format and Color	Modify slide colors and formats to different tastes. Current colors and formats are conservative in nature.
Prepare Other GEPs	Using the same formats, create GEP Sessions to address specific shipyard issues.
Cut and Paste	Remove text to be incorporated into other documents and integrate text as needed from other related documents.
Link Files	Link individual GEP files together to arrange Training Programs for selected craft groups.
Integrate With Other Documents or Manuals	Many of the GEPs can be integrated with BMP, SWPP, and other permits and plans. Similarly, information from shipyard specific plans can be integrated into the GEP Sessions.

Software and Hardware Requirements

Software Requirements

The basic software requirements will enable the user to fully modify the training program to fit into their organization. The software can be operated by individuals who have a basic understanding of personal computers (PCs) "IBM compatibles" and experience working in a Windows environment.

Software Needed (Minimum Versions)

- Microsoft Windows 95
- Microsoft Word 7.0
- Microsoft Power Point 6.0
- Corel Photo-Paint Version 5.0

Hardware Requirements

The software required to modify and fully utilize this document has basic hardware requirements that must be fulfilled to run the programs. The minimum hardware arrangement will be very slow for modifying the presentations and the photographs. The photographs take a significant amount of memory and processing time. It is very desirable to have a Pentium processor and enough memory to store the training program on the hard drive. The table below displays minimum requirements and a highly recommended computer hardware systems for maximum use of the training document.

Minimum Requirements	Highly Recommended
Processor: 386	Processor: 486 or a Pentium
RAM: 8 Megabytes	RAM: 16 Megabytes or more
Hard Drive: 240 Megabytes	Hard Drive: 1 Gigabyte or more
Display: VGA	Display: SVGA
Mouse	Mouse: Logitech
Windows 95	Windows 95
iomega Zip Drive 100	CD ROM
Microsoft Office 7.0	Math Co-Processor
	Video Card - w/1M DRAM or more
	Color Scanner

Integrating Pictures into the Presentations

In many cases, shipyards will want to integrate pictures from their own operations into the presentation. This is easily accomplished using Corel Photopaint.

First Step - Getting photos and graphics in a format that the computer can read:

There are a couple of ways this can be accomplished. One method is to take 35mm pictures and have them transferred to CD-ROM. Kodak *Photo CD* is an excellent method. Consult your local photo developing labs about this process. It takes approximately 7 days and the cost is around \$3.00 a picture. Another method is to scan the pictures yourself on a personal scanner. This may be accomplished in the publishing department of the shipyard or at a local copy shop. The photos are usually saved as "tif" files (i.e. HAZMAT.tif). Other types of files will also work; consult Corel and Microsoft word manuals.

Second Step: - Integrate photos into the presentation:

- 1) In Microsoft Power Point, photos and graphics are inserted as "Objects".
- 2) To add a picture to a presentation, Insert and Object. Double Click on the Object box. The computer will ask from what application (Corel Photo-Paint). This will open Photo-Paint.
- 3) The first screen asks for the size and resolution of the photo. For a typical horizontal slide, set parameters to (Width = 378 Pixels, Height = 256 Pixels, Resolution 300, Color Mode = 256). Experiment with these settings to match your picture requirements.
- 4) Once in Photo-Paint, input "Edit" - "Paste From File". Now, if you have the photo on CD, identify the drive and the picture desired. Click "OK"
- 5) It is a good idea to perform some picture enhancements prior to fully importing the photo into Photo-Paint. When the first window comes up, click on "Image enhancement". The Kodak color corrections functions are the best. Try to enhance the photo by adding green, red, blue, brightness, and/or sharpness with the provided functions. Once the picture looks acceptable, click, OK.
- 6) Now the picture is on the screen inside the dimensions that you set in the parameters. The picture should be close to the size identified. Only the picture inside the dimensions specified will be transferred to Microsoft Power Point or Word.
- 7) Now click on "File" - "Close and Update;" this closes Corel Photo-Paint and returns you back to Power Point or Word. The picture will show up on the screen very small. Click on the picture and drag a corner. This will increase the picture size without distorting it.
- 8) Cropping the picture is frequently helpful. Click on the picture and then pull down the TOOLS menu and CROP PICTURE. The Crop function allows you to cut the picture and focus in a particular area. Once the picture is cropped, click on the Arrow and then click on the picture to enlarge and position it properly. Remember, always enlarge the photo by dragging from the corner.

Summary and Table of Contents of Good Environmental Practices Sessions for Module 1 (NSRP 0541) and Module 2 (NSRP 0542)

GENERAL GEPs DIRECTORY (Module 1, NSRP 0541)

INTRODUCTION TO GOOD ENVIRONMENTAL PRACTICES (1-Introduction to Shipyard GEPs.doc)

OBJECTIVE To introduce the basic environmental awareness and good environmental practices.

ENVIRONMENTAL LAW (2-Environmental Law.doc)

OBJECTIVE Provide a brief overview of Federal environmental statutes that impact the daily shipyard operations.

PROPER HAZARDOUS MATERIAL HANDLING (3-Material Handling.doc)

OBJECTIVE Increase personal safety and environmental preservation through the proper handling of hazardous materials.

CHEMICAL HAZARDS IN THE SHIPYARD (4-Chemical Hazards.doc)

OBJECTIVE Identify specific hazards of chemicals used within the shipyard.

HAZARDOUS MATERIAL CONTAINER LABELING (5-Labeling.doc)

OBJECTIVE To understand the importance of maintaining proper labeling of hazardous and non-hazardous materials, products and/or waste.

GOOD HOUSEKEEPING (6-Good Housekeeping.doc)

OBJECTIVE Maintain and clean and organized shipyard to minimize the likelihood for accidental pollution. This mean that the entire shipyard, as well as your immediate work area, should be kept clean and well organized.

POLLUTION PREVENTION AND POLLUTION PATHWAY ANALYSIS (7-Pollution Pathways.doc)

OBJECTIVE To enlighten shipyard employees about pollution pathway analysis and their local environmental surroundings. Shipyard personnel are to identify potential pollution pathways in their work-scope.

VOCs AND OTHER AIR QUALITY CONCERNS (8-Air Pollution.doc)

OBJECTIVE To minimize the release of vapors and dusts into the atmosphere, which may be harmful to employee health, public health, and the environment.

NO DUMPING! (9-No Dumping.doc)

OBJECTIVE Eliminate the discharge of pollutants into the surface waters, storm drains, sewers, sinks, toilets, grounds or air.

MINIMIZE THE POTENTIAL FOR PAINT SPILLS (10-Paint Spills.doc)

OBJECTIVE To follow simple practices that can help minimize paint spills that cost companies time and money.

IN YARD HAZARDOUS MATERIALS/WASTE TRANSPORTATION (11-Transporting Hazardous Materials.doc)

OBJECTIVE To minimize the likelihood of spills and other hazardous accidents during the transportation of hazardous materials and wastes throughout the shipyard.

EMPLOYEE LEVEL SPILL RESPONSE (12-Spill Clean-up.doc)

OBJECTIVE Ensure quick and safe response to hazardous materials spills in the shipyard.

SECONDARY CONTAINMENT (13-Secondary Contrainment.doc)

OBJECTIVE To identify the "secondary containment" requirements and systems to be used in the shipyard and promote their use in preventing hazardous materials spills and leaks. Also, to ensure that secondary containment systems are in place to catch accidental spills, leaks, and splashing of chemicals and wastes.

LIQUID STORAGE AREAS (14-Hazmat Storage.doc)

OBJECTIVE Provide an area where hazardous liquids can be stored that will help ensure potential spillage from containers such as paint cans, solvent drums, and oil drums does not soak into the underlying soils or enter nearby surface waters.

MANAGING COMMON SHIPYARD WASTES (15-Common Shipyard Wastes.doc)

OBJECTIVE Identify proper management of common shipyard wastes.

WASTE MINIMIZATION, REUSE, RECYCLING AND RECLAMATION (16-Recycling.doc)

OBJECTIVE Promote waste minimization, recycling, reuse and reclamation in the shipyard.

INSPECTIONS AND PERFORMANCE EVALUATION (17-Evaluation.doc)

OBJECTIVE To increase awareness and help to ensure that shipyard workers follow GEPs in their areas.

PURCHASING HAZARDOUS MATERIALS (18-Purchasing Hazardous Materials.doc)

OBJECTIVE To introduce prudent purchase practices to reduce costs and environmental liabilities.

AIR GEP DIRECTORY Module 2 (NSRP 0542)**ABRASIVE BLASTING IN THE SHIPYARD (1ABRASIV.DOC)**

OBJECTIVE To use proper practices, procedures and facilities to minimize the release of fugitive abrasive blast material into the environment.

ABRASIVE BLAST CLEAN-UP, STORAGE AND TRANSPORTATION (2ABR-STR.DOC)

OBJECTIVE To ensure that abrasive blast material remains in control through proper clean-up, storage, transfer and transportation practices.

INDOOR ABRASIVE BLASTING BOOTHS, CABINETS AND TANK /COMPARTMENTS (3ABR-BTH.DOC)

OBJECTIVE To minimize particulate matter emissions from abrasive blasting operations in booths, tanks and compartments through implementation of preventive maintenance and other practices.

ABRASIVE BLAST CONTAINMENT (4ABR-CNT.DOC)

OBJECTIVE To reduce particulate matter emissions from abrasive blasting operations in shipyards through implementation of containment facilities, and structures.

COMPOSITE MATERIAL OPERATIONS (5COMPSIT.DOC)

OBJECTIVE To reduce particulate matter, volatile organic compound (VOC), and hazardous air pollutant (HAP) emissions derived from composite material operations through changes in work practices, processes, and through implementation of training and management policies.

DEGREASING OPERATIONS (6DEGRES.DOC)

OBJECTIVE To reduce emissions from various degreasing operations through work practice changes and equipment modification.

SOLVENT WIPING OPERATIONS (7SOL-WIP.DOC)

OBJECTIVE To reduce fugitive emissions from solvent wiping operations through process modification, material substitution, work practice changes, and equipment modification.

OZONE DEPLETING SUBSTANCES (ODS) EVALUATION AND CONTROL (8ODS.DOC)

OBJECTIVE To reduce usage and releases of Ozone Depleting Substances (ODSs).

WELDING OPERATIONS (9-WELD.DOC)

OBJECTIVE To implement and maintain procedures and practices that minimize the release of potentially toxic substances from shipyard welding operations.

ASBESTOS OPERATIONS IN THE SHIPYARD (10ASBTOS.DOC)

OBJECTIVE To ensure that shipyard personnel are aware of accidental disturbances and planned removal of asbestos containing material in shipyard facilities and on ships.

METAL FINISHING OPERATIONS (11MET-PT.DOC)

OBJECTIVE To reduce fugitive emissions from metal finishing operations such as plating and pickling processes through work practice changes and equipment modification.

WATER GEP DIRECTORY Module 2 (NSRP 0542)**CONTROLLING DISCHARGES TO DRY-DOCK FLOORS (1-DKFLR.DOC)**

OBJECTIVE To control and contain potential releases from shipboard systems while the ship is under repair or new construction in dry-dock or in a building position.

ROUTINE AND PRE-DOCKING DRY-DOCK CLEANUP (2-CLEAN.DOC)

OBJECTIVE To ensure that materials on the dock floors and building positions are cleaned-up on a regular basis which helps to ensure a clean and safe working environment.

OVER WATER PROTECTION (3-OVER.DOC)

OBJECTIVE To provide minimize the potential for pollution when work is performed over water on berthed vessels and there is the potential for pollutants to enter the surface water.

STORM DRAIN PROTECTION (4-STORM.DOC)

OBJECTIVE To keep storm drains and their surrounding areas clean and cleared in such a manner to minimize the likelihood of storm water washing debris and other pollutants into adjacent waters.

LEAKING PIPES, HOSES, AND VESSEL CONNECTIONS (5-LEAKIN.DOC)

OBJECTIVE Prevent potential pollutants leaking from hoses, valves, couplings and vessel connections from entering surface waters and storm drains through inspections, secondary containment, and procedures for immediate repair.

PIER AND DECK SCUPPERS AND DRAINS (6-PIERS.DOC)

OBJECTIVE To prevent pollutants from entering the receiving waters through pier, berth and ship scuppers and drains.

PIPE TESTING AND FLUSH WATERS (7-FLUSH.DOC)

OBJECTIVE To ensure that flush and test waters used for piping systems and tanks are not discharged to surface waters, storm drains, or other pollution pathways.

WASHDOWN WATER CONTAINMENT AND CONTROL (8-WASHDN.DOC)

OBJECTIVE To ensure that contaminated wash water from fresh and salt water washdown of vessels does not enter adjacent surface waters.

STEAM CLEANING IN THE SHIPYARD (9-STEAM.DOC)

OBJECTIVE To properly contain, collect, and discharge all steam cleaning effluents.

OIL CONTAINMENT BOOM DEPLOYMENT (10-OILCN.DOC)

OBJECTIVE To ensure that accidental spills or other floatables lost to adjacent waters are contained and cleaned up efficiently.

CONTROLLING BILGE AND BALLAST WATERS (11-BLDG.DOC)

OBJECTIVE To prevent discharges of contaminated bilge and ballast water to adjacent surface water and also prevent unauthorized discharges to sewer connections.

INDUSTRIAL WASTE WATER DISCHARGE CONTROL (12-INDUS.DOC)

OBJECTIVE To ensure that all industrial waste water is disposed in accordance with local, state, and federal regulations and the policies and practices of the shipyard.

CONTROLLING SANITARY SHIPBOARD WASTEWATER (13-GREY.DOC)

OBJECTIVE To minimize the potential for sanitary waste water (gray and black) from ships to become uncontrolled and enter adjacent surface waters.

SHIPYARD SALTWATER FIRE SYSTEMS (14-FIRE.DOC)

OBJECTIVE Ensure the all discharges from saltwater fire systems are a non-contact processes and free of potential pollutants.

SHIPBOARD SALTBOX DISCHARGES (15-SALT.DOC)

OBJECTIVE To prevent the discharge of "contaminated" or high temperature saltbox water to adjacent surface waters or storm drains.

HAZARDOUS MATERIALS AND WASTE (HAZ-CORD) GEP DIRECTORY Module 2 **(NSRP 0542)**

HAZARDOUS MATERIALS IN THE SHIPYARD (1-HZ-MATS.DOC)

OBJECTIVE - To describe what hazardous materials are, their usage in the shipyard, and Material Safety Data Sheets (MSDS').

HAZARDOUS MATERIAL CONTAINER LABELS (2-LABEL.DOC)

OBJECTIVE - To explain and understand hazardous material labels to better determine how to protect yourself and the environment.

HAZARDOUS MATERIALS PRE-PURCHASE SCREENING (3-SCREEN.DOC)

OBJECTIVE - To describe in detail how hazardous materials are brought into the shipyard and identify methods for hazardous materials control.

PURCHASING HAZARDOUS MATERIALS (4-PURCH.DOC)

OBJECTIVE - To purchase hazardous materials prudently and ensure that they have been reviewed by Safety and Environmental before they are ordered.

RECOGNIZING HAZARDOUS WASTE (5-WASTE.DOC)

OBJECTIVE - To recognize and identify hazardous wastes for proper handling and disposal practices and procedures.

HAZARDOUS WASTE ACCUMULATION (6-ACCUM.DOC)

OBJECTIVE - To understand the waste accumulation process and associated practices and procedures for compliance, safety and environmental protection.

PROPER DISPOSAL AND CONTROL OF EMPTY CONTAINERS (7-EMPTY.DOC)

OBJECTIVE - To ensure that empty containers are disposed of in an appropriate and efficient manner.

HAZARDOUS MATERIALS AND WASTES STORAGE AREAS (8-HZ-STR.DOC)

OBJECTIVE - To provide storage areas for hazardous materials and hazardous wastes.

OIL STORAGE & CONTAINMENT (9-OIL-ST.DOC)

OBJECTIVE - To ensure proper storage of oil and oily waste water in the shipyard.

HANDLING HAZARDOUS WASTES (10-HANDL.DOC)

OBJECTIVE - To understand proper handling of hazardous wastes to prevent personal injuries, environmental spills, and other hazardous incidents.

MARKING & LABELING HAZARDOUS WASTES (11-MARK.DOC)

OBJECTIVE - To understand proper marking and labeling of hazardous waste containers for accumulation and transportation.

IN-YARD TRANSPORTATION OF HAZARDOUS WASTE (12-WTRANS.DOC)

OBJECTIVE - To understand the importance of proper in-yard transportation of hazardous waste and ensure efforts to minimize spills and associated hazardous incidents.

CRADLE TO GRAVE RESPONSIBILITY (13-CADL.DOC)

OBJECTIVE - To explain the importance of proper hazardous material disposal and the role of hazardous waste Transporters and Treatment, Storage, Disposal and Recycling Facilities (TSDRFs).

SPILL CLEAN-UP AND RESPONSE PLANNING (14-SPILL.DOC)

OBJECTIVE - To identify and follow procedures and practices for spill response and cleaning-up small spills.

ENVIRONMENTAL INCIDENT REPORTING AND INTERNAL RESPONSE SYSTEM (15-REPOR.DOC)

OBJECTIVE - To understand spill and environmental incident reporting procedures and practices in the shipyard and become familiar with the emergency response plan.

EXTERNAL ENVIRONMENTAL REPORTING AND REPORTABLE QUANTITIES (Rqs) (16-RQS.DOC)

OBJECTIVE - To identify responsibilities with respect to external reporting of environmental emergencies, spills and other hazardous materials incidents and to understand "Reportable Quantities" (RQs).

OIL AND BULK HAZARDOUS MATERIAL TRANSFER (OIL-TRANS) GEP DIRECTORY
Module 2 (NSRP 0542)

INTRODUCTION TO TRANSFER OF OIL AND BULK HAZARDOUS MATERIALS (1-INTRO.DOC)

OBJECTIVE To introduce the students to the contents of the training and the learning objectives

LETTER OF INTENT (2-LETTR.DOC)

OBJECTIVE To understand the purpose and requirements of a shipyard facility "Letter of Intent."

FACILITY REQUIREMENTS, OPERATIONS MANUAL, AND LETTER OF ADEQUACY (3-OP-MAN.DOC)

OBJECTIVE To understand the facility requirements imposed by the shipyard operations manual and describe the letter of adequacy.

EQUIPMENT REQUIREMENTS (4-EQUIP.DOC)

OBJECTIVE To understand the equipment requirements associated with transferring oil or hazardous materials in bulk quantity to and from ships and other vessels.

PERSON IN CHARGE QUALIFICATIONS (5-PIC.DOC)

OBJECTIVE To define a shipyard bulk fluid transfer "Persons In Charge" (PIC) and associated qualifications.

SAFETY REQUIREMENTS (6-SAFTY.DOC)

OBJECTIVE To understand safety requirements associated with transferring oil and other bulk hazardous materials to and from ships and other vessels.

RECORDS AND RECORDKEEPING (7-RECORD.DOC)

OBJECTIVE To be aware of records that need to be kept at a shipyard engaged in oil and other bulk hazardous material transferring operations.

PROCEDURES FOR SPILLS, LEAKS AND OTHER INCIDENTS (8-SPILL.DOC)

OBJECTIVE To understand the process for reporting and responding to spills and other incidents during bulk oil and hazardous material transfer operations.

RESPONSE PLAN (9-RPLAN.DOC)

OBJECTIVE To understand the facility oil spill response plan and its requirements.

DECLARATION OF INSPECTION (10-INSPT.DOC)

OBJECTIVE To understand the importance of the declaration of inspection and its requirements.

TRANSFER REQUIREMENTS (11-TRANFR.DOC)

OBJECTIVE To understand the procedural and preparation requirements for transferring oil or hazardous materials from or to a vessel.

POST-TRANSFER REQUIREMENTS (12-PSTRS.DOC)

OBJECTIVE To understand the procedural and post-transfer requirements for transferring oil or hazardous materials from or to a vessel.

POST TEST (13-TEST.DOC)**DEPARTMENT OF TRANSPORTATION REGULATIONS FOR HAZARDOUS MATERIALS
TRANSPORTATION (DOT) GEP DIRECTORY Module 2 (NSRP 0542)****INTRODUCTION TO DOT TRAINING (1INTRO.DOC)**

OBJECTIVE To introduce the principal subjects covered in this training and the primary learning objectives.

HAZARD CLASSES & DIVISIONS (2HAZ-CLS.DOC)

OBJECTIVE To become familiar with the different hazard classes and divisions of hazardous materials, as specified in 49 CFR for hazardous materials transportation.

HAZARDOUS MATERIALS TRANSPORTATION TABLES (3TABLES.DOC)

OBJECTIVE To become familiar with and be able to utilize the Table of Hazardous Materials as presented in 49 CFR 172.101, and Appendix A, Hazardous Substances, and Appendix B, List of Marine Pollutants.

SHIPPING PAPERS FOR HAZARDOUS MATERIALS (4SHP-PAP.DOC)

OBJECTIVE To properly prepare shipping paper using the information as provided in the hazardous materials table, 49 CFR 172.101.

GENERAL MARKING REQUIREMENTS - (5MARLNG.DOC)

OBJECTIVE To become familiar with general marking requirements to prepare hazardous materials for transportation.

LABELING REQUIRED FOR HAZARDOUS MATERIALS TRANSPORTATION (6LABEL.DOC)

OBJECTIVE To become familiar with the labeling requirements and to choose a proper label(s) to prepare for hazardous material transport.

PERFORMANCE HAZARDOUS MATERIALS PACKAGING (7PACKAGE.DOC)

OBJECTIVE To understand DOT performance packaging standards for proper shipment of hazardous materials.

PLACARDING FOR HAZARDOUS MATERIALS TRANSPORTATION (8PLACKARD.DOC)

OBJECTIVE To learn the importance and general requirements of placarding for proper transportation of hazardous materials.

LOADING AND UNLOADING OF HAZARDOUS MATERIALS (9LOADING.DOC)

OBJECTIVE To understand proper loading and unloading procedures and practices for hazardous materials while moving to and from motor vehicles.

EMERGENCY RESPONSE FOR HAZARDOUS MATERIALS TRANSPORTATION (10EMERGY.DOC)

OBJECTIVE To understand the emergency response requirements mandated by the DOT in 49 CFR for transportation of hazardous materials.

INCIDENT REPORTING FOR HAZARDOUS MATERIALS TRANSPORTATION (11REPORT.DOC)

OBJECTIVE To become aware of proper reporting procedures to follow in an event of incident involving hazardous materials.

POST TEST (12TEST.DOC)**PAINT GEP DIRECTORY Module 2 (NSRP 0542)****PAINT MATERIALS CONTROL AND RECORDKEEPING LIFE-CYCLE (1-MATRI.DOC)**

OBJECTIVE To enhance shipyard environmental management and improve compliance through accurate paint materials control and proper record keeping.

PAINT AREA ORGANIZATION AND HOUSEKEEPING (2-ORGANZ.DOC)

OBJECTIVE Maintain a clean and organized paint area to minimize the likelihood for accidental spills and potential pollution problems.

PAINT EQUIPMENT MAINTENANCE AND CLEAN-UP (3-CLEAN.DOC)

OBJECTIVE To clean and maintain paint equipment in such a manner that ensures proper operation and environmental protection.

SECONDARY CONTAINMENT AREAS AND MAINTENANCE (4-CONTAI.DOC)

OBJECTIVE Utilize secondary containment whenever possible and maintain the containment area.

PAINT STORAGE AND MIXING AREA MANAGEMENT (5-STORX.DOC)

OBJECTIVE To provide proper storage facilities and mixing areas for paint material usage and waste accumulation.

WASTE STORAGE AND ACCUMULATION REQUIREMENTS (6-WSTORE.DOC)

OBJECTIVE To store and accumulate wastes in an organized manner in compliance with all federal, state, and local requirements.

PAINT WASTE MINIMIZATION AND RECYCLING (7-WSTMIN.DOC)

OBJECTIVE To promote waste minimization, recycling, reuse and proper reclamation techniques in the paint department.

MINIMIZE OVERSPRAY AND INCREASE TRANSFER EFFICIENCY (8-OVERSP.DOC)

OBJECTIVE To minimize the amount of paint overspray and increase overall transfer efficiencies while painting throughout the shipyard.

OUTDOOR PAINT OVERSPRAY CONTAINMENT (9-TARPS.DOC)

OBJECTIVE To reduce particulate matter emissions from painting operations in shipyards through implementation containment shrouding and wind screens.

BOOTHS, CABINETS AND INDOOR TANK/COMPARTMENT PAINTING (10-BOOTH.DOC)

OBJECTIVE To minimize particulate matter and VOC emissions from painting operations in booths, tanks and enclosed compartments through implementation of preventive maintenance and improved environmental practices.

SOLVENT WIPING SURFACE PREPARATION (11-WIPE.DOC)

OBJECTIVE To reduce volatile emissions from solvent wiping operations through process modification, material substitution, work practice changes, and equipment modification.

PAINT CRAFT AREA INSPECTION (12-INSPE.DOC)

OBJECTIVE Inspect and evaluate paint area compliance with all good environmental practices.

PREVENTIVE MAINTENANCE (PM) GEP DIRECTORY Module 2 (NSRP 0542)**ENVIRONMENTAL PREVENTIVE MAINTENANCE (1-PM-INTRO.DOC)**

OBJECTIVE To implement preventive maintenance measures that reduce the potential for accidental leaks and excessive operational emissions.

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OBJECTIVE To minimize emissions generated by operating boilers through proper maintenance, fuel substitution, and improved management practices.

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ENVIRONMENTAL TRAINING MODULES

MODULE 2

Shipyard Craft Specific Training

AIR

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

**AIR
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ABRASIVE BLASTING IN THE SHIPYARD (1ABRASIV.DOC)

OBJECTIVE To use proper practices, procedures and facilities to minimize the release of fugitive abrasive blast material into the environment.

**ABRASIVE BLAST CLEAN-UP, STORAGE AND TRANSPORTATION
(2ABR-STR.DOC)**

OBJECTIVE To ensure that abrasive blast material remains in control through proper clean-up, storage, transfer and transportation practices.

**INDOOR ABRASIVE BLASTING BOOTHS, CABINETS AND TANK
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ABRASIVE BLAST CONTAINMENT (4ABR-CNT.DOC)

OBJECTIVE To reduce particulate matter emissions from abrasive blasting operations in shipyards through implementation of containment facilities, and structures.

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OBJECTIVE To reduce particulate matter, volatile organic compound (VOC), and hazardous air pollutant (HAP) emissions derived from composite material operations through changes in work practices, processes, and through implementation of training and management policies.

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***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

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OBJECTIVE

To use proper practices, procedures and facilities to minimize the release of fugitive abrasive blast material into the environment.

ABRASIVE BLASTING

Abrasive blasting is a mechanical surface preparation method performed to remove surface contaminants to provide enhanced coating adhesion on surface substrates. Common contaminants can include mill scale, rust, salt, dirt, oxidization, and/or flaked coatings. Blasting materials used in shipbuilding largely consist of the following: copper slag, coal slag, steel grit and shot, aluminum oxide, garnet, walnut shells, silica sand and a few others.

POTENTIAL EMISSIONS

The primary emission from grit blasting operations is particulate matter that can contain hazardous air pollutant (HAP) materials. The HAP portion of the emission may include trace amounts of chrome, nickel, and lead. The emissions can also include respirable particulates such as particulate matter under ten microns (PM₁₀) which is a listed criteria pollutant and, PM₁₀ HAPs depending on the abrasive blasting media and the substrate being blasted.

ABRASIVE BLASTING POLLUTION PATHWAYS

Fugitive emissions from blasting operations can travel to other parts of the shipyard or outside of the facility carried by air or by water. Also, fugitive emissions from blasting operations within the shipyard can end up in other production areas leading to unnecessary worker exposure and potential contamination of other shipyard production activities such as painting. Blast media can end up in and/or around storm drains, or in other drainage pathways which can impact storm water quality and cause sediment contamination.

Fugitive emissions can also travel outside of the shipyard and impact the general public including industrial, commercial, and residential neighbors. Fugitive emissions that impact these neighbors can potentially result in public nuisance complaints or potential health problems that require a lot of time and money to resolve.

**ABRASIVE
BLASTING IN THE
SHIPYARD****NOTES:**

ABRASIVE BLASTING OPERATIONS

Abrasive blasting can occur in the following shipyard areas:

- Outdoor Open Air Blasting (Yard-Wide)
- Booth or Cabinet Blasting (Controlled Booths)
- Indoor Blasting (Inside Large Buildings)
- Tank and Compartment Blasting (On-Board Ships)
- Ship Hull Blasting (Dry-dock)
- Superstructure Blasting (Decks and Deckhouses)

GOOD ENVIRONMENTAL PRACTICES

ALTERNATE SURFACE PREPARATION TECHNIQUES

- ♦ Investigate alternative surface preparation methods such as hydro-blasting or slurry blasting to replace abrasive blasting. Although, remember that all surface preparation methods need some type of environmental control and good environmental practices.
- ♦ When feasible, use localized surface preparation methods for small jobs such as needle guns, etching, solvent/cleaner wiping or sanding when appropriate. This is mainly applicable to small parts and will reduce particulate matter emissions and the need for excessive clean up.

PROCESS IMPROVEMENTS

- ♦ Investigate up-stream process changes to eliminate or reduce the need for abrasive blasting surface preparation requirements. For example, construction primer must be blasted off once it becomes rusted. Identify methods of ensuring that parts are processed and coated prior to primer deterioration and rusting, this will eliminate the need for blasting off construction primer.

BOOTH BLASTING

- ♦ Encourage blasting of small parts in booths. Booths are enclosed and reduce the amount of abrasive that becomes uncontrolled and released into the environment. (See GEP on Blasting Booths)

ABRASIVE BLASTING IN THE SHIPYARD (Cont.)

NOTES:

**PERPENDICULAR BLASTING TO REDUCE AIRBORNE
ABRASIVE**

- ♦ The way a blaster performs the blasting operation can affect the quantity of particulate emissions. For example, if the blaster angles the blast stream at an up-ward angle, the blast material rebounds off the surface and becomes airborne. On the other hand, if the blaster maintains an angle close to perpendicular and aimed slightly downward, most of the blast material will be in more control and land on the deck surface below. The shipyard should stress training that emphasizes blasting methods to minimize the amount of grit blast that can become airborne and potentially lost to the environment.
- ♦ Similarly, the blaster can reduce blasting pressure when there is a higher potential for media to become airborne and uncontrolled.

REDUCED EMISSION PRODUCING ABRASIVES USAGE

- ♦ Investigate using certified abrasive blast media. Certified blast media will lower emissions from blasting operations. California has a program to evaluate abrasive blast media and its production of emissions. Through this program, abrasive blast media that meet stringent emission standards are certified for outdoor use where emissions are of greatest concern.

**ABRASIVE
BLASTING IN THE
SHIPYARD**

(Cont.)

NOTES:

ABRASIVE BLASTING IN THE SHIPYARD

1) BLASTING OPERATIONS IN THE SHIPYARD

WHY BLASTING IS INTEGRAL IN THE SHIPYARD

WHERE BLASTING OCCURS IN THE SHIPYARD

2) POTENTIAL BLASTING POLLUTION PATHWAYS

EMISSION TYPES: PM - PM10 -HAPs

EXPOSURE OF PUBLIC AND SHIPYARD WORKERS

POLLUTION PATHWAYS

AIR TO GROUND TO WATER/SEDIMENT

AIR TO WATER/SEDIMENT

AIR TO PUBLIC TO WATER/SEDIMENT

GROUND TO WATER/SEDIMENT

3) GENERAL ABRASIVE BLASTING GEPS

USE IMPROVED BLASTING TECHNIQUES TO
REDUCE FUGITIVE EMISSIONS

USE BOOTHS OR OTHER ALTERNATE SURFACE
PREPARATION METHODS

REDUCING UP-STREAM NEED FOR BLASTING

LESS EMISSION PRODUCING BLAST MATERIALS

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To ensure that abrasive blast material remains in control through proper clean-up, storage, transfer and transportation practices.

Abrasive blasting is one of the primary tasks performed when ships are constructed, repaired and maintained. The task typically involves blasting the vessels hull and decks with abrasive slag media to prepare surfaces for a new coating system. As a result, large volumes of spent abrasive are generated and must be cleaned up, stored, transferred, and transported properly on a regular basis. The spent abrasive must be managed properly throughout operations to ensure minimal releases to the environment.

GOOD ENVIRONMENTAL PRACTICES

CLEAN-UP PRACTICES

- ♦ It is the responsibility of all shipyard personnel using, transporting, and disposing of abrasive blast grit to clean up the material after usage and/or spills.
- ♦ Clean-up generally involves the use of hand brooms, mechanical sweepers, and vacuums. Whatever method used, the abrasive must be cleaned up as completely as possible.
- ♦ Always clean up abrasive blast material in a manner which prevents the material from entering storm drains, drainage channels or other pathways to surface waters.
- ♦ Clean up all spills of abrasive blast material in production areas and facility roadways.
- ♦ Never clean-up abrasive materials with water washdown.
- ♦ Contaminated shrouding material and equipment must be thoroughly cleaned-up before storage and/or properly disposed when the job is complete.
- ♦ Periodically, scattered abrasive may be blown and trapped under the shroud. When this occurs the abrasive must be swept up to prevent it from escaping into surface waters.

ABRASIVE BLAST CLEAN-UP, TRANSPORTATION AND STORAGE

NOTES:

STORAGE PRACTICES

- ♦ Abrasive blast containers and piles of abrasive must be located away from storm drains, gutters, and other routes to adjacent surface waters.
- ♦ Stockpiles of abrasive blast grit must be managed to prevent rainwater from entering the area, and causing pollutant runoff during storms. This can be accomplished utilizing tarp covers during rainfall or storing abrasive in covered areas.
- ♦ Storage bins, tanks, hoppers and containment areas must have covers to prevent rainwater from entering the container. Covers are also helpful in preventing fugitive dusts caused by wind.
- ♦ Always segregate abrasive blast material from general refuse. Do not dispose of general trash in a spent abrasive container. Similarly, do not dispose of abrasive in general trash containers. All containers used to store spent abrasive blast material should be properly labeled.

TRANSFER AND TRANSPORTATION PRACTICES

- ♦ Minimize the amount of dusts developed during transfer operations. Dust can be minimized using a light water-spray, and using containment tarps.
- ♦ Prevent spills of abrasive during transfer and transportation. If spills should occur, clean up the materials immediately with brooms and dust pans.
- ♦ Abrasive blast materials and wastes must be transported and stored in a manner which prevents contact with process water and/or exposure to rainwater.
- ♦ All blast media should be covered during transportation to avoid losses of particulate to the wind.

DISPOSAL PRACTICES

- ♦ Never dispose of spent abrasive material in regular trash containers.

ABRASIVE BLAST CLEAN-UP, TRANSPORTATION AND STORAGE (Cont.)

NOTES:

OBJECTIVE

To minimize particulate matter emissions from abrasive blasting operations in booths, tanks and compartments through implementation of preventive maintenance and other practices.

Shipyards abrasive blasting operations are frequently performed indoors, in cabinets, other enclosures, booths and inside tanks. Booth and/or cabinet blasting equipment is primarily used to prepare small parts, beams, or plates for primer prior to assembly or for subsequent coating application.

BLASTING BOOTHS AND CABINETS

Blasting operations carried out using equipment such as blasting cabinets or booths usually use air pressure for propelling blast media or can use a variety of mechanical propulsion methods. The blasting system includes a hopper for blast media storage and collection, a pot for blast media containment, and a nozzle to manipulate the blast media stream fan and speed. When the blast media is propelled at high speeds toward a surface, the action results in breaking up surface contaminants and, if intended, in creating an anchor pattern for application of subsequent coatings.

Wheelabrator is a brand name of semi-automatic blasting machines that can be attached to a semi-automatic paint line or primer-line. The shot is recycled and filtered through a baghouse similar to a blast cabinet. Small blasting cabinets are primarily used in the machine shops, wire spray operations, and other small scale surface preparation areas.

SHIPBOARD TANKS AND COMPARTMENTS

A large amount of blasting occurs inside shipboard tanks and other indoor compartments on ships under repair and new construction. Coal and copper slag abrasive materials are predominantly used because of physical requirements and cost benefits. When blasting in tanks and enclosed spaces, blasters are fitted with supplied air suits and the compartment is closed off and ventilated with a high CFM dust collector. The dust collectors frequently utilize a pleated polyester cartridge filter.

ABRASIVE BLASTING BOOTHS, CABINETS AND TANKS/COMPARTMENTS

NOTES:

GOOD ENVIRONMENTAL PRACTICES

BOOTHS AND CABINETS

- ♦ It is always a good environmental practice to set up a preventive maintenance program and initiate frequent inspections to ensure proper blasting equipment operation.
- ♦ Inspect abrasive blast equipment including pots, hoses, and baghouses for breaks, holes, and leaks regularly. (See Abrasive Blasting Self Inspection Checklist)
- ♦ Ensure cabinet and booth filters are installed properly, in good condition, and are free of blockage.

TANKS AND COMPARTMENTS

- ♦ Water used for liquid ring vacuums should not be directed into receiving waters unless it is allowed in the shipyard waste water discharge permit.
- ♦ All bag filters associated with the vacuum system should be inspected and replaced as needed.
- ♦ Exit air from compartments and tanks during blasting should be directed in such a manner that keeps any dust emissions under control. The exit air could be captured in a specific area and any abrasive dust swept-up or an additional filter can be installed on the end to capture the dust from exit air.
- ♦ All equipment should be on a preventive maintenance schedule to ensure proper blasting operations.
- ♦ Ensure that all blasters and individuals inside the blasting area are using proper PPE.

ABRASIVE BLASTING BOOTHS, CABINETS AND TANKS/COMPARTMENTS (Cont.)

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

**Abrasive Blasting
Self Inspection Checklist**

Inspector: _____

Equipment or Permit No.: _____

Week of: _____

Inspection Points		Mon	Wed	Fri	Comments
Containment in Place					
Manometer Reading					
Filters in Place					
No Holes or Leaks					
No Fugitive Emissions					
Part Size					
Type of Media					
Amount of Media					
Operator's Initials	1st shift				
	2nd shift				
	3rd shift				

OK = No problem Identified

X = Problem Identified

Notify the Maintenance Department of all equipment problems.

**ABRASIVE BLASTING
BOOTHS, CABINETS AND
TANKS/COMPARTMENTS
(Cont.)**

NOTES:

OBJECTIVE

To reduce particulate matter emissions from abrasive blasting operations in shipyards through implementation of containment facilities, and structures.

ABRASIVE BLASTING OPERATIONS

Ship repair and new construction usually involves the use of abrasive blast material to prepare vessel surfaces prior to painting. Blasting can generate large amounts of fugitive dusts and large amounts of material that could potentially become airborne and enter surface waters through a number of different pathways. In order to minimize the potential discharges of pollutants to surface waters, shrouding is installed and utilized wherever practical.

Typically open blasting is performed outdoors in a designated open air area in the shipyard. For example, a blasting pit may be identified for blasting miscellaneous sub-assemblies and blocks. Similarly, floating dry-docks and graving docks are the location for blasting ship hulls. Superstructure blasting can be performed in berthing positions or in dry-dock.

OPEN AREA BLASTING

Open air and outdoor blasting is used on larger structures prior to the application of coatings. The On-Block Area and/or Blast Pit Area of the shipyard is where large sub-assemblies are blasted. Blasting is generally contained by Eagle Screen or shrink-wrapping, depending on variables such as the use of scaffolding and size of area blasted.

SUPERSTRUCTURE BLASTING

During repair and new construction, superstructures on the top-side of the ship need refinishing. In recent years, shipyards have been using a “shrink-wrap” or “Eagle Screen” material to contain blast media and paint overspray on superstructures. The process begins with a full scaffolding of the superstructure followed by the application of a material that encloses the scaffolding around the superstructure. The material enclosure provides an excellent containment area. When blasting in the enclosure, blasters are fitted with supplied air suits and the compartment is ventilated with a high CFM dust collector.

ABRASIVE BLAST CONTAINMENT

NOTES:

HULL BLASTING

Hull Blasting is performed at all docking locations (e.g. graving dock, ways, and floating dry-dock). In all cases, the screening used to control blast media is very similar. Containment material is draped from the ship railings on the deck to the surface of the dock or the dock wall, which creates an enclosed “cocoon” area. Also, a localized screening is often utilized at the hull surface. This localized screening causes blast media to fall directly below the blaster to reduce the amount of abrasive from becoming airborne.

SALLY PORTS

Floating dry dock sally ports are openings in the dock wing walls through which service lines are routed into the dock area and water passes when raising or lowering the dock. These openings also have the potential to allow the discharge of pollutants that fall from the dock to the surface waters. Abrasive blasting, spray painting, water blasting, welding, and numerous other repair and repair related pollutants have the potential of exiting the sally ports and entering surface waters.

GOOD ENVIRONMENTAL PRACTICES

CONTAINMENT PLANNING AND MANAGEMENT

- ♦ The installation, maintenance, and removal of containment facilities must be integrated into the production process by all departments involved (i.e. surface preparation, paint, facilities, and support)
- ♦ Establish a policy of screening and containing all floating dry-dock sally ports, hull blasting operations, superstructure blasting, and all open areas in the shipyard.
- ♦ Establish a policy to curtail blasting operations during high wind conditions and during erratic wind directions.
- ♦ Ensure that all individuals inside and around blasting operations and containment facilities have proper PPE and understand safety precautions.

ABRASIVE BLAST CONTAINMENT

(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

ENSURE PROPER DESIGN AND CONSTRUCTION

- ♦ Proper design, construction, and position of the shrouding is important to its overall effectiveness.
- ♦ Evaluate use of containment methods such as shrink wrapping, shrouding, or screening when blasting operations are conducted in areas above boot tops, on-block or in other designated shipyard areas.
- ♦ Screen size must be adequate to prevent the potential movement of abrasive blast media and paint over spray. Containment such as tarpaulins, shrouds or portable structures must be utilized to minimize airborne particles from entering surface waters.
- ♦ Shrouds should be large enough to adequately enclose or segregate the working area from surface waters.
- ♦ Support structures such as scaffolding must be used in conjunction with shrouding to withstand potential wind stress.

PERFORM INSPECTIONS, EVALUATIONS AND MAINTENANCE

- ♦ Establish a preventive maintenance program for blasting equipment and containment support structures.
- ♦ Inspect and evaluate containment facilities for effectiveness. If problems exist, have them corrected immediately.
- ♦ Institute new and improved containment facilities in efforts to continuously improve performance.
- ♦ Prior to sinking the floating dry-dock sally port screens must be thoroughly cleaned, removed and/or disposed.
- ♦ Clean-up the grit blast after use and store the spent grit in appropriate containment systems until disposal.

ABRASIVE BLAST CONTAINMENT

(Cont.)

NOTES:

OBJECTIVE

To reduce particulate matter, volatile organic compound (VOC), and hazardous air pollutant (HAP) emissions derived from composite material operations through changes in work practices, processes, and through implementation of training and management policies.

COMPOSITE MATERIAL OPERATIONS

Because composite materials are strong lightweight materials that provide corrosion protection, their use in shipyards is of steadily increasing importance. Although currently the application of composites in steel shipbuilding is limited and very specialized, it is expanding as new uses are proven applicable. Composite materials can be found in superstructure components such as railings, antennae, radar dishes, and weapon systems as well as in the construction and repair of propeller shafts and other ship components. Such components include insulation material, furniture, fixtures, and a variety of small equipment parts.

For the purpose of this GEP, composite materials are basically plastic resin reinforced with fiber materials. The common types of plastic used include epoxy, polyester, and silicone. The common types of fibers used include glass, carbon, polyester, cotton, and nylon. The basic steps in manufacturing composite material parts are: tool manufacturing, surface preparation of the tool (mold), gel coat application, polyester resin lay-up, fiber material lay-up, cutting, grinding, sanding, curing, painting, clean-up, and curing.

POTENTIAL EMISSIONS

Composite material operations can generate dust emissions from the cutting, grinding and sanding of the tool and fiber components. Much of the dust is federally listed criteria pollutant. Surface preparation, gel coat application, polyester resin lay-up, painting, clean-up, and curing activities involved in composite material operations result in VOC and HAP emissions.

**COMPOSITE
MATERIAL
OPERATIONS**

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

GOOD ENVIRONMENTAL PRACTICES

IMPROVED WORK PRACTICES

- ♦ Use drip pans for hand lay-up work and always place covers on VOC material containers when not in use.
- ♦ Use booths or containment equipped with air collection and filtration systems when possible for sanding, grinding, or cutting operations.

INSPECTION AND MAINTENANCE

- ♦ Encourage self-inspection of air collection and filtration systems of booths and work areas when applicable. Inspections are directed to determine and ensure proper operations and functioning.
- ♦ Establish a preventive maintenance schedule for booth or containment air collection and filtration systems.
- ♦ Replace booth filters when a significant drop in airflow occurs through the filter.

RECORDKEEPING AND HOUSEKEEPING

- ♦ Establish and maintain a record keeping system for all composite material operations including resin, gel coats, solvents and fibers.
- ♦ Frequently sweep and vacuum work areas for increased cleaning, reduced dust emissions and improved safety environment.

PROCESS MODIFICATION EVALUATIONS

- ♦ Evaluate the use of low monomer content resins.
- ♦ Evaluate the use of low VOC cleanup solvents.
- ♦ Evaluate use of preimpregnated composite materials.

COMPOSITE MATERIAL OPERATIONS (Cont.)

NOTES:

OBJECTIVE

To reduce emissions from various degreasing operations through work practice changes and equipment modification.

Degreasing is readily recognizable in many shipyard work areas. Machine shops, paint shops, maintenance shops, electrical shops, and pipe shops are a few areas where parts washers, vapor degreasers, or aqueous or semi-aqueous cleaning tanks are an integral part of operation processes.

COLD DEGREASING

Cold degreasing involves spraying, brushing, flushing, and immersing the parts in a dip tank. The solvent is occasionally heated, but always remains well below the solvent's boiling point temperature. The solvent is often agitated mechanically or ultrasonically to enhance the cleaning action. Mineral spirits, methyl ethyl ketone (MEK), and methylene chloride are a few commonly used cold degreasing solvents.

VAPOR DEGREASING

Vapor degreasing is also found in shipyards. In vapor degreasers, solvent vapors condense on the parts to dissolve and displace oily contaminants until the temperature of the parts approaches the boiling point of the solvent. When condensation ceases, the clean parts are slowly withdrawn from the degreaser. Trichloroethylene, 1-1-1 trichloroethane, perchloroethylene, and trichlorotrifluoroethane (CFC 113) are widely used vapor degreasing solvents.

AQUEOUS CLEANING

Aqueous and semi-aqueous cleaning tanks have attempted to replace many of the traditional cold solvent degreasers and vapor degreasers in recent years. Generally, parts are immersed in a cleaning bath. The cleaning tank may be heated and/or mechanically or ultrasonically agitated for enhanced cleaning action. Parts are then rinsed with clean water to remove any residue. Terpenes, blends of alcohols, glycol ethers, and surfactants are widely used in aqueous and semi-aqueous cleaning.

POTENTIAL EMISSIONS

Most solvent emissions occur during removal of parts from degreasing equipment. Pollutants emitted from degreasing operations include volatile organic compounds (VOCs), hazardous air pollutants (HAPs), and ozone depleting substances (ODSs).

DEGREASING OPERATIONS

NOTES:

GOOD ENVIRONMENTAL PRACTICES

WORK PRACTICE MODIFICATIONS

- ♦ Keep all solvent containing containers closed when the degreaser is not being used.
- ♦ Discourage spraying or agitating solvents using air. Use a steady liquid stream or brush cleaning.
- ♦ In vapor degreaser, only work in or below the vapor zone.
- ♦ Do not degrease porous or absorbent materials such as wood and paper products.
- ♦ Rack parts in a manner to allow for maximum drainage and do not overload the degreaser's racking system.
- ♦ Tip out any pools of solvent on the cleaned parts before removing from the degreaser.
- ♦ Remove parts from degreaser slowly. For a solvent degreaser, ensure all parts appear dry before removing from the degreaser.

INSPECTIONS AND RECORDKEEPING

- ♦ Keep records of solvent usage and used solvent disposal and perform inspections of degreasers for leaks or other problems regularly.
- ♦ Frequently inspect all degreasers and ensure that they are kept in good working condition. Fix all leaks, ill fitting covers, or inefficient chillers immediately.

MANAGEMENT POLICES

- ♦ Scrutinize the processes for possible modifications: What are the process and cleaning requirements? Is cleaning a necessary step in the whole process? How clean is clean enough? Investigate an alternate solvent. Replace high VOC, ODS, HAP, or toxic solvents, whenever possible.

DEGREASING OPERATIONS

(Cont.)

NOTES:

FACILITY MODIFICATIONS

- ♦ Install covers. A cover is the single most important control device for open top degreasers. A tight fitting cover on the degreaser prevents evaporation and saves solvent.
- ♦ For vapor degreasers, ensure that the covers open and close in a horizontal motion to minimize the air/vapor interface disturbance when removing and inserting parts.
- ♦ For aqueous cleaning tanks, consider covering the surface of the liquid with plastic balls designed to minimize evaporation.
- ♦ Increase the freeboard distance. The freeboard is the distance from the top of the solvent (for cold degreasers) or vapor (for vapor degreasers) to the top of the tank. The freeboard serves to reduce drafts near the air/solvent interface. An acceptable freeboard height is usually determined by the freeboard ratio, the freeboard height divided by the width of the degreaser's air/solvent area. The minimum freeboard ratio of 0.75 is recommended by the American Society for Testing and Materials (ASTM).
- ♦ Consider installing a hoist or conveyor to lower and raise parts into and out of degreaser to prevent solvent “drag out”.

DEGREASING OPERATIONS

(Cont.)

NOTES:

OBJECTIVE

To reduce fugitive emissions from solvent wiping operations through process modification, material substitution, work practice changes, and equipment modification.

SOLVENT WIPING SURFACE PREPARATION

Solvent wiping is an integral part of surface preparation prior to various shipyard operations such as plating, painting, bonding, welding, etc. Also, many maintenance operations require wipe cleaning with solvent. Solvent wiping can occur in nearly any location in the shipyard because it is a highly portable process. Generally, solvent wiping is a production cleaning process employing solvents to dissolve or displace contaminants from part surfaces. An operator accomplishes cleaning by wiping the contaminated surface with a solvent dampened wiper (rag, paper, etc.). Chlorinated solvents, alcohol's, aromatic solvents, and terpenes are widely used for solvent wiping.

POTENTIAL EMISSIONS

Solvent wiping has a significant potential for emissions of VOCs, ODSs, and HAPs. The type of solvent used for cleaning and the operators' cleaning practices will effect the level of emissions during cleaning operations.

GOOD ENVIRONMENTAL PRACTICES

MATERIAL SUBSTITUTION

- ♦ Consider alternate solvents to replace high VOC, ODSs, and other toxic solvents with more environmentally friendly solvents.

PROCESS MODIFICATIONS

- ♦ Evaluate the processes for possible modifications: What are the process cleaning requirements? Is cleaning a necessary step in the whole process? How clean is clean enough? Can different methods of cleaning such as dip cleaning replace wipe cleaning?

SOLVENT WIPING OPERATIONS

NOTES:

IMPROVED CLEANING TECHNIQUES

- ♦ Use plungers and squeeze bottles to transfer solvent to a wiper. Discourage direct transferring of solvent from drums or large containers to the wiper material to prevent spills and over saturating the wiper material.
- ♦ Encourage proper cleaning techniques: Discourage pouring solvent directly onto the part. Dampen, do not saturate, the wiper with solvent. Clean a small area at a time.
- ♦ Encourage operators to employ cleaning practices that curtail unnecessary emissions from solvent wiping operations

CONTAINER MANAGEMENT

- ♦ Discourage use of spray bottles for high VOC solvents such as MEK and alcohols.
- ♦ Provide containers with covers at or near the work area. Line the container with plastic liner for better retention of solvent and its vapors.
- ♦ Encourage disposal of dirty rags in a closed container immediately upon completion of solvent wiping.
- ♦ Empty the job site containers daily into a storage drum with a lid.

SOLVENT WIPING OPERATIONS

(Cont.)

NOTES:

OBJECTIVE

To reduce usage and releases of Ozone Depleting Substances (ODSs).

OZONE DEPLETING SUBSTANCES (ODS)

ODSs have a wide array of uses in the shipbuilding industry. In recent years, it has been determined that they are damaging the ozone layer and potentially cause global warming. Therefore, shipyards are taking steps to reduce the use of ODS materials. ODSs are generally used in refrigeration and air conditioning plants, fire suppression systems and as a blowing agent for thermal insulation materials. During construction and repair, shipyards may use ODSs in one or more of the following five areas:

- 1) Industrial solvent cleaning for a variety of electrical and non-electrical surface cleaning applications.
- 2) Fire extinguishing and suppression systems including: Halon 1211, primarily used for applications in handheld extinguishers and Halon 1301, used for total flooding and explosion protection.
- 3) Refrigeration systems for food storage, cold storage warehouse refrigeration, air conditioning systems and chillers. These systems are frequently removed, rebuilt, and otherwise recharged by shipyard personnel.
- 4) Paints, adhesives, aerosols, and inks used for a variety of shipbuilding needs.
- 5) Insulation materials on-board ships.

Chlorofluorocarbons (CFCs) are a major ODS concern because of their ozone-depleting potential. Methyl chloroform, a CFC, otherwise known as 1,1,1-trichloroethane and CFC-113 are being phased out of production by January 1, 1996. To ensure and support the elimination of ODSs, the DOD has required that "... no DOD contract awarded after June 1, 1993, may include a specification or standard that requires the use of a class I (CFC) ozone depleter..." This requirement also includes modification of previous repair and new construction contracts.

**OZONE DEPLETING
SUBSTANCES (ODS)
EVALUATION AND
CONTROL**

NOTES:

EVALUATE CURRENT ODS USAGE

- ♦ Analyze shipyard operation to determine when, where, why, and how much ODSs are used at the shipyard through the following techniques: inspection of purchase records, physical inspections, interview with production managers and staff and determine the inventory of ODS related equipment and substances.

DEVELOP AN ODS MANAGEMENT STRATEGY

Address the Following Four (4) Issues

1) REFRIGERATION AND AIR CONDITIONING OPERATIONS

- ♦ Proper maintenance of facility and shipboard systems including proper refrigerant recycling and venting procedures and proper disposal of refrigeration and other ODS containing equipment
- ♦ Outline efforts to recycle refrigerants, retrofit to new alternative refrigerants, or replace old and potentially inefficient equipment with HCFCs or HFCs.

NOTE: Venting CFCs (Class I substances) and HCFCs (Class II substances) to the atmosphere is prohibited by law. Therefore, shipyards must ensure the following: 1) Only certified technicians are allowed to maintain, service, and repair air conditioning and refrigeration systems, 2) Only certified technicians are legally authorized to purchase refrigerants, and 3) All Class I and II substances must be recycled by a certified reclaimer using EPA certified recovery equipment.

2) FIRE EXTINGUISHING AND SUPPRESSION

- ♦ Setup procedures to ensure that fire extinguishing systems on-board ships and within the shipyard facility are repaired, tested, and/or dismantled properly to prevent accidental releases.

3) SOLVENT CLEANING OPERATIONS

- ♦ Investigate and implement alternative cleaning techniques and chemicals to eliminate ODS containing degreasing solutions. Aqueous, semi-aqueous (including those based on terpenes or petroleum based hydrocarbons), and many options are available to replace ODS substances.

OZONE DEPLETING SUBSTANCES (ODS) EVALUATION AND CONTROL

(Cont.)

NOTES:

4) PAINTS, ADHESIVES, AEROSOLS, AND INKS

- ♦ Paints, aerosols, adhesives, and inks used in the shipyard environment should be ODS free. Ensure that ODSs are not contained within these production materials whenever feasible.

PHASING OUT ODS USAGE IN THE SHIPYARD

PHASEOUT TEAM

- ♦ Setup a phaseout team consisting of environmental management, production personnel, and equipment & chemical vendors. Develop an action plan to investigate alternative processes and materials and establish an implementation schedule.

POTENTIAL SUBSTITUTES

- ♦ Significant New Alternative Policy (SNAP) substitutes are published in the Federal Register March 18, 1994 (59 FR 13044). Consult the EPA SNAP substitutes prior to implementing substitutes for industrial cleaning, aerosols, adhesives, coating, and inks.
- ♦ Perchloroethylene, methylene chloride and trichloroethylene are not part of the phaseout because they are not a regulated ODS substance under the Clean Air Act, although they are regulated substances that are potentially toxic to human health and the environment. These substances are regulated as Hazardous Air Pollutants (HAPs) under Title III of the 1990 CAA.
- ♦ Ensure that all ODS substitutes are compliant with the specific state and local environmental regulations and permits. Similarly all OSHA regulations concerning substitute materials should be evaluated.
- ♦ Investigate using low VOC plastics and coatings for products cured in drying ovens.

OZONE DEPLETING SUBSTANCES (ODS) EVALUATION AND CONTROL (Cont.)

NOTES:

OBJECTIVE

To implement and maintain procedures and practices that minimize the release of potentially toxic substances from shipyard welding operations.

WELDING OPERATIONS

Shipyards perform a variety of welding operations throughout the shipyard during ship construction and repair work. Welding is predominately used for pipe fitting, sheet metal ventilation, steel hull-structure joining, and shipyard maintenance. Welding occurs throughout shipbuilding and repair processes and at nearly all production shops, outdoor and indoor platens, on-board ships, and in confined spaces.

There are several different types of welding processes used for shipbuilding and repair. Each welding process has a unique set of advantages and disadvantages when applied to shipyards. The four main welding processes include the following: (1) Shielded Metal Arc Welding (SMAW), (2) Gas Metal Arc Welding (GMAW), (3) Flux Cored Arc Welding (FCAW) and (4) Submerged Arc Welding (SAW). The majority of welding operations and materials are tightly regulated by Military Specifications (Navy) and the American Bureau of Shipping (ABS) for commercial vessels.

Welding processes utilize electrodes, filler metals, wire, coatings, and/or gases that may contain several potentially toxic substances. The high operating temperatures can cause hazardous fumes to be released. Fumes containing Hazardous Air Pollutants (HAPs) are a major concern with welding emissions. Potentially hazardous metals identified in welding fumes include: manganese (Mn), nickel (Ni), chromium (Cr), hexavalent chromium (Cr⁺⁶), cobalt (Co), and lead (Pb), and zinc (Zn).

GOOD ENVIRONMENTAL PRACTICES

RECORDKEEPING PRACTICES

- ♦ Keep records of welding rod consumption (lbs.) by shipyard location and weld rod type.

WELDING OPERATIONS

NOTES:

PROCESS EVALUATION

- ♦ Investigate and evaluate switching to welding consumables and processes (rods, wires, electrodes, etc.) that produce less toxic emissions.
- ♦ Investigate and evaluate shipyard welding operations for potentially toxic welding emissions and analyze potential collection and control options.

FACILITY MODIFICATIONS

- ♦ Consider providing collection hoods in critical welding applications (i.e. indoors, confined spaces, and potentially high toxicity emissions).

EDUCATION AND TRAINING

- ♦ Educate welders about potentially toxic welding emissions and the importance of using exhaust hoods, respirators, and collection systems

WELDING OPERATIONS

(Cont.)

NOTES:

OBJECTIVE

To ensure that shipyard personnel are aware of accidental disturbances and planned removal of asbestos containing material in shipyard facilities and on ships.

Throughout the years, asbestos has had a wide variety of industrial and commercial applications. These applications include using asbestos as insulation, reinforcement of construction materials, and use in friction products. These materials are frequently found in construction materials used for shipyard facilities and ships under repair. In the past, asbestos was extensively used as gasket and insulation material for steam pipes and boilers in ships. With the exception of United States based shipyards, these materials are still used in shipbuilding and repair operations throughout the world for both military and commercial vessels.

ASBESTOS REMOVAL

Asbestos is typically removed prior to renovation or demolition of shipyard facilities and ships under repair. On ships, asbestos removal is typically done before repair of heating, ventilation, and air conditioning systems, boilers, and power generation equipment. Asbestos removal practices in shipyard facilities and on ships follow similar practices. In areas where asbestos cannot be removed, the asbestos along with the substrate is typically removed and disposed of as hazardous waste. Asbestos on piping is commonly removed using the glove bag method. This method involves isolating a section of a pipe with a plastic bag equipped with arm/hand gloves. For flat surface areas, a plastic containment area with a negative air pressure ventilation system is set up to remove asbestos.

EMISSIONS AND REGULATIONS

Since the late 1970's the use of asbestos in building construction and U.S. shipbuilding and repair operations has declined primarily because of health concerns and regulations adopted and promulgated by U.S. federal agencies such as the Environmental Protection Agency (EPA) and Occupational Safety and Health Agency (OSHA) from the mid to the late 1980s. Asbestos is a federally classified hazardous air pollutant (HAP). Asbestos particulate matter is respirable and has been known to cause lung cancer and other related lung illnesses.

ASBESTOS OPERATIONS IN THE SHIPYARD

NOTES:

GOOD ENVIRONMENTAL PRACTICES

NOTIFICATION SYSTEM

- ♦ Help prevent exposure by establishing an internal notification system to keep shipyard workers, including subcontractors and government personnel, aware of accidental disturbances of asbestos and asbestos removal activities. These notifications can be done through signs in work areas, on bulletin boards, or through announcements at work group meetings.

IMPROVED PRACTICES

- ♦ Control the area where asbestos is being removed. This is accomplished with ropes, signs and watch persons.
- ♦ Adequately mark all areas where asbestos materials are going to be removed. Notice can be given by way of a warning sign. This will allow other workers that must reschedule operations around that area or wear the proper protective equipment.

PERSONNEL TRAINING

- ♦ Ensure that training is provided to all shipyard personnel and subcontractors to recognize asbestos removal work areas.
- ♦ Ensure that training is provided to shipyard personnel and subcontractors to report any accidental disturbance of facilities containing asbestos in the shipyard.

FACILITIES MANAGEMENT PRACTICES

- ♦ Ensure all facilities containing asbestos in the shipyard are clearly identified.
- ♦ Establish an internal notification procedure to report any accidental disturbances and planned removal of asbestos containing material in shipyard facilities and on ships.

ASBESTOS OPERATIONS IN THE SHIPYARD (Cont.)

NOTES:

OBJECTIVE

To reduce fugitive emissions from metal finishing operations such as plating and pickling processes through work practice changes and equipment modification.

SHIPYARD METAL FINISHING

Metal finishing is an integral process to shipbuilding and repair operations. Metal finishing operation is found in various locations within a shipyard including pipe shop, electrical motor shop and machine shop. Metal parts are pickled or plated to prepare for painting or to provide for conductive properties, decorative appearance, and/or corrosion resistance.

PICKLING AND ETCHING PARTS

Pickling steel parts is accomplished by immersing steel parts in a series of corrosive baths, generally caustic soda and sulfuric acid tanks. Ferrous and nonferrous metal parts are plated in a copper, cadmium, silver, or chromium bath, or may be brush plated. Generally parts are cleaned with a solvent before being plated. Potential pollutants from metal finishing include volatile organic compounds (VOCs) from cleaning operation and hazardous air pollutants (HAPs) from plating and pickling bath solutions.

GOOD ENVIRONMENTAL PRACTICES

MATERIAL SUBSTITUTION

- ♦ Consider choosing less harmful chemicals for metal finishing processes. Replace high VOC, ozone depleting, or toxic chemicals with less environmentally hazardous chemicals.

FACILITY MODIFICATIONS

- ♦ Consider installing covers over plating baths if the configuration of the tanks allow. Covers help minimize plating solution evaporation and keep the plating bath clean.

METAL PICKLING AND ETCHING OPERATIONS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ Consider using floating balls in pickling baths. The balls provide the same effect as covers.
- ♦ Consider installing an air curtain and scrubber to pickling and plating tanks.

MAINTAIN OPERATIONAL CONSTRAINTS

- ♦ Maintain the temperature, concentration, and cleanliness of plating and pickling baths to your yard's specification or the manufacturers' recommendations.

INSPECTIONS AND RECORDKEEPING

- ♦ Regularly perform inspection of pickling and plating tanks for leaks and other irregularities that could result in unwanted emissions.
- ♦ Maintain records of chemical usage and tank inspection. Create a metal finishing inspection checklist and material usage form for increased accountability and control.

METAL PICKLING AND ETCHING OPERATIONS (Cont.)

NOTES:

ENVIRONMENTAL TRAINING MODULES

MODULE 2

Shipyard Craft Specific Training

WATER

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

WATER

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OBJECTIVE To control and contain potential releases from shipboard systems while the ship is under repair or new construction in dry-dock or in a building position.

ROUTINE AND PRE-DOCKING DRY-DOCK CLEANUP (2-CLEAN.DOC)

OBJECTIVE To ensure that materials on the dock floors and building positions are cleaned-up on a regular basis which helps to ensure a clean and safe working environment.

OVER WATER PROTECTION (3-OVER.DOC)

OBJECTIVE To provide minimize the potential for pollution when work is performed over water on berthed vessels and there is the potential for pollutants to enter the surface water.

STORM DRAIN PROTECTION (4-STORM.DOC)

OBJECTIVE To keep storm drains and their surrounding areas clean and cleared in such a manner to minimize the likelihood of storm water washing debris and other pollutants into adjacent waters.

LEAKING PIPES, HOSES, AND VESSEL CONNECTIONS (5-LEAKIN.DOC)

OBJECTIVE Prevent potential pollutants leaking from hoses, valves, couplings and vessel connections from entering surface waters and storm drains through inspections, secondary containment, and procedures for immediate repair.

PIER AND DECK SCUPPERS AND DRAINS (6-PIERS.DOC)

OBJECTIVE To prevent pollutants from entering the receiving waters through pier, berth and ship scuppers and drains.

PIPE TESTING AND FLUSH WATERS (7-FLUSH.DOC)

OBJECTIVE To ensure that flush and test waters used for piping systems and tanks are not discharged to surface waters, storm drains, or other pollution pathways.

WASHDOWN WATER CONTAINMENT AND CONTROL (8-WASHDN.DOC)

OBJECTIVE To ensure that contaminated wash water from fresh and salt water washdown of vessels does not enter adjacent surface waters.

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CONTROLLING BILGE AND BALLAST WATERS (11-BLDG.DOC)

OBJECTIVE To prevent discharges of contaminated bilge and ballast water to adjacent surface water and also prevent unauthorized discharges to sewer connections.

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OBJECTIVE To ensure that all industrial waste water is disposed in accordance with local, state, and federal regulations and the policies and practices of the shipyard.

CONTROLLING SANITARY SHIPBOARD WASTEWATER (13-GREY.DOC)

OBJECTIVE To minimize the potential for sanitary waste water (gray and black) from ships to become uncontrolled and enter adjacent surface waters.

SHIPYARD SALTWATER FIRE SYSTEMS (14-FIRE.DOC)

OBJECTIVE Ensure the all discharges from saltwater fire systems are a non-contact processes and free of potential pollutants.

SHIPBOARD SALTBOX DISCHARGES (15-SALT.DOC)

OBJECTIVE To prevent the discharge of “contaminated” or high temperature saltbox water to adjacent surface waters or storm drains.

OBJECTIVE

To control and contain potential releases from shipboard systems while the ship is under repair or new construction in dry-dock or in a building position.

DOCK FLOOR CONCERNS

On occasion, shipyards conduct operations on vessels and equipment where releases to dock floors may be required or accidental. Liquid discharges to dock floors are undesirable because they can come into contact with contaminants (paint overspray, abrasive, etc.) on the dock floor. The fluid will become polluted and can potentially be released to adjacent waters. If uncontrolled, the vessel discharge can find its way to adjacent waters.

SHIP COMPARTMENT CONCERNS

There are several shipboard working fluids that must be managed on board ships during repair and new construction. Working fluids will include oils, hydraulic fluid, coolant, and several others. When these fluids are changed, workers must control the liquid and minimize the potential for spills. If a spill occurs on board the ship and hazardous materials (working fluids) is mixed with a large tank of waste water (i.e. bilge water, ballast water, cooling water, gray water and sanitary water) the entire batch of water can become a hazardous waste and need very expensive treatment and disposal.

Unwanted releases can occur when up-front planning does not include a plan for discharging these waters. Good environmental practices will be directed at minimizing unexpected discharges and planning for controlling discharges directed to dock floors.

GOOD ENVIRONMENTAL PRACTICES

PRE-PLANNED DISCHARGES TO DOCK FLOORS

- ♦ Discharges to the dock floor should always be pre-planned and approved. Unplanned discharges to dock floors should be treated as spills.
- ♦ Dock floor should be clean and the pathway for the discharged liquid should be well defined and bermed for added control.

CONTROLLING DISCHARGES ONTO DOCK FLOORS AND INTO SHIP COMPARTMENTS

NOTES:

- ♦ Non-Contact cooling water is an example of a liquid that may be discharged to the dock floor when the floor is clean and all pre-planned discharge requirements are met.

MANAGING WORKING FLUID DISCHARGES

- ♦ Tank compartment cleaning within the vessels interior can generate large amounts of wastewater. Bilge water, ballast water, non-contact cooling water, gray water and sanitary waste are also sources of pollutants and must be managed appropriately.
- ♦ Appropriate management of tank waste and cleaning waters will generally include collecting the water in shipyard tanks, barges, or pump trucks. In some cases, the water needs treatment prior to disposal in the local sewer. In other cases, the waste water can be discharged directly into the sewer.
- ♦ Liquids that may be hazardous, such as oils, grease, hydraulic fluid, and wastewater shall NOT be directed to the dock floor. They should be directed to containment tanks that are adequate to prevent a release to the adjacent surface waters.
- ♦ Secondary containment systems are generally used in conjunction with collection tanks and are constructed with facilities such as berms, drip pans, plastic sheeting, absorbent materials, and tanks. Other containment systems (plastic sheeting, absorbent, berms, drip pans) can also be set-up to catch or collect liquid spills. In any case, the containment should be adequate to prevent a release to the environment.
- ♦ The transfer of liquids in such a manner so as not to cause a discharge to the environment, can generally be accomplished with a containment system adequate to prevent the material from entering the dock floor or adjacent surface waters. Tanks should have secondary containment systems to collect overflow, spills and other accidents during transfer operations.

CONTROLLING DISCHARGES ONTO DOCK FLOORS AND INTO SHIP COMPARTMENTS (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To ensure that materials on the dock floors and building positions are cleaned-up on a regular basis which helps to ensure a clean and safe working environment.

All aspects of vessel construction, repair and maintenance at one time or another are performed in building positions and/or dry-docks. Vessel construction, repair and maintenance generates numerous sources of potential pollutants. These potential pollutants include blast abrasives, paint, paper trash, discarded construction material, marine growth, oil, solvents, and plastics. Since these potential pollutants fall upon the ground or dock floor there is the possibility of pollutants being transferred by water or air to adjacent surface waters through a series of pollution pathways.

Good environmental practices will serve to minimize the likelihood that potential pollutants become uncontrolled and released to the environment by wind, rain, and poor operational practices:

GOOD ENVIRONMENTAL PRACTICES

ROUTINE CLEAN-UP

- ♦ General yard cleanup operations shall be followed on all dry-docks and building positions on a regular basis. This includes frequent broom cleaning, trash removal, area organization, and equipment repairs.
- ♦ Cleaning of the dock floors and building positions shall be performed on a regular basis. The potential for pollutant discharges via storm water runoff and wind is always present.

NO WATER WASHDOWN

- ♦ Water washdown of the dock floor is NOT an acceptable routine dock cleanup technique and shall not be performed unless approved by the environmental department.

ROUTINE AND PRE-DOCKING DRY-DOCK CLEANUP OPERATIONS

NOTES:

DOCK DRAINAGE MAINTENANCE

- ♦ All floor channels, sediment traps, sumps, etc. shall be checked and cleaned regularly to remove pollutants and refuse.

PRE-FLOODING CLEAN-UP

- ♦ Before flooding the dry dock or graving dock, all equipment and materials will be removed and the floor shall be swept with a broom.

SUBCONTRACTS AND CUSTOMERS

- ♦ Ensure that subcontractors, shipyard department personnel, and customers performing work in the dock area follow routine clean-up procedures on the dock floor and ensure that areas are clean, organized and ready when transferred to the next shift.

**ROUTINE AND
PRE-DOCKING
DRY-DOCK
CLEANUP
OPERATIONS**

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To minimize the potential for pollution when work is performed over water on berthed vessels and there is the potential for pollutants to enter the surface water.

OVER-WATER WORK

Vessels are frequently repaired while the ship is berthed alongside a pier or other type of berthing area. In some cases, work is performed on the outer side of the ship or the stern or bow. In these cases, floats, lighters, pontoons or working barges are used to provide access over water. The work performed on the floats usually includes abrasive blasting, chipping, grinding, spray painting, welding/burning and other related hull repair operations. Much of this work generates trash and other pollutants that have the potential of falling into the water below if not properly contained.

GOOD ENVIRONMENTAL PRACTICES

SHROUDING AND CONTAINMENT

- ♦ Shrouding and containment systems shall be installed on the working platform to minimize the accidental discharge of trash, paint, and other pollutants to surface waters. Effective shrouding must be properly designed, constructed, positioned and erected.
- ♦ Position containment in-between the floats and the ship. This generally includes tarpaulins, plastic sheeting, eagle screens and shrink wrap that connect the vessels hull to the float prior to performing work operations.

SECONDARY CONTAINMENT

- ♦ Secondary containment shall be used on all of the floating work area. This will minimize the likelihood of pollutant transfer in the case of material spills and leakage. The secondary containment should be free of holes and cracks and be able to hold a minimum of 110% of the largest container or 100% of all containers, whichever is greater.

OVER WATER PROTECTION FACILITIES AND PROCEDURES

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

CLEANING PRACTICES

- ♦ The floats and pier shall be cleaned of all trash and potential pollutants as often as possible to prevent spills and at least at the end of each shift.
- ♦ It is the responsibility of all employees working on floats to maintain a clean and organized work area because of the extreme potential for a spill or other discharge into nearby waters.

CONTAINMENT BOOMS

- ♦ Floating containment booms shall be placed around the vessel and floats prior to any hull work being performed.

WIND AND WEATHER CONDITIONS

- ♦ Special attention shall be given to existing wind and weather conditions in order to further minimize discharges to surface waters.

OVER WATER PROTECTION FACILITIES AND PROCEDURES

NOTES:

OBJECTIVE

To keep storm drains and their surrounding areas clean and cleared in such a manner as to minimize the likelihood of storm water washing debris and other pollutants into adjacent waters.

STORM WATER

Storm water runoff is defined as the flow of surface water resulting from precipitation (rain). In most cases, storm water runoff is directed to storm drain inlets and drainage channels that are located throughout the shipyard. Shipyards can have anywhere from 1 to 100 storm drains located in a variety of places throughout the shipyard production areas. These storm drains have the potential of collecting and discharging pollutants to surface waters due to their proximity to certain manufacturing processes and operations. It is a very important part of any industrial environmental compliance program to address minimizing storm water pollution through Good Environmental Practices.

GOOD ENVIRONMENTAL PRACTICES

HAZARDS NEAR STORM DRAINS

- ♦ There shall be minimal storage of hazardous materials/wastes near any storm drain within the shipyard. Employees who store hazardous materials near storm drains are causing potentially unnecessary spills and discharges for the shipyard.
- ♦ Special engineering may be required for storm drains that are located near process areas, where the potential for process fluids entering the drain is high. For example, control valves, total drain blockage and/or storm water diversion systems may be the solution to prevent pollution.

SPILLS NEAR STORM DRAINS

- ♦ If a spill of a hazardous pollutant occurs near a storm drain responder shall provide a curb, berm, dike, or other protection device immediately to prevent the pollutant from entering the drain.

STORM DRAIN PROTECTION

NOTES:

STORM DRAIN GRATES, SCREENS, AND BERMS

- ♦ In some cases, storm drains within the shipyard are fitted with grate screens, berms and other mechanisms which serve to help stop pollutants (i.e. trash, construction materials, loose grit, sediment and oil) from entering into the storm water conveyance system.

STORM DRAIN MAINTENANCE

- ♦ Storm drains within the shipyard are cleaned on a periodic preventive maintenance schedule. The screens are cleaned to remove debris and allow for better storm water flow.

NO DUMPING

- ♦ Do not utilize storm drains for disposal of paints, solvents, oils, trash abrasive blast grit, debris, etc. Illegal dumping to storm drains or surface waters is unacceptable and unlawful.

STORM DRAIN MARKING

- ♦ It is an excellent environmental practice to mark storm drains with signs that may read as follows: “No DUMPING - I live down stream” or “Rain Only in the Drain”. This helps to ensure that employees are aware of these potential discharge points.

STORM DRAIN PROTECTION

(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

Prevent potential pollutants leaking from hoses, valves, couplings and vessel connections from entering surface waters and storm drains through inspections, secondary containment, and procedures for immediate repair.

POTENTIAL POLLUTION PATHWAY

Vessel construction and repair generally requires numerous hose and piping connections to be made between the vessel and shore. A large portion of these connections include sanitary waste disposal, gray water, bilge and ballast water, non-contact cooling water, steam supply and fire water. Leakage from these sources could fall directly into the surface waters or flow onto the dock, into a nearby storm drains or other pathway that may discharge to adjacent waters.

GOOD ENVIRONMENTAL PRACTICES

EDUCATIONAL AWARENESS

- ♦ Everyone must understand that leakage from hose connections are unapproved/illegal for discharge into receiving waters. In many cases, these leaks should be reported as spills.

ROUTINE INSPECTIONS

- ♦ Inspections of hoses, piping connections, and valves should be conducted on a regular basis by crafts directly involved with connections and pumping. Other crafts should report leaks when they are observed.

REPAIR LEAKS IMMEDIATELY

- ♦ When leaks are detected, they should be reported and the leak should be immediately repaired. It will then need to be determined if the leak (spill) reached surface water and if outside reporting is required.
- ♦ As an excellent preventive maintenance measure, hose and pipe connection replacement items should always be in stock and ready for replacement.

LEAKING PIPES, HOSES, AND VALVE CONNECTIONS FROM VESSELS

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

IMPROVED PROCEDURES

- ♦ Secondary containment facilities (drip pan, bucket, tarps and berms, etc.) should be used when breaking and making hose connections.
- ♦ It is the responsibility of each person in charge to ensure proper connections in piping, hoses, pumps and ensure all associated equipment is free of leaks when the system is assembled. All equipment defects must be repaired and/or replaced immediately.

ENSURE ALL DISCHARGES ARE APPROVED

- ♦ Eliminate unapproved pollutant discharges from vessels that are moored, dry docked, or under construction.
- ♦ Approved discharges will generally have a set of procedures defined by the department involved and have input and approval by the Environmental department.

**LEAKING PIPES,
HOSES, AND VALVE
CONNECTIONS FROM
VESSELS**

(Cont.)

NOTES:

OBJECTIVE

To prevent pollutants from entering the receiving waters through pier, berth and ship scuppers and drains.

SCUPPERS AND DRAINS

Pier and deck scuppers and drains allow storm water and other washdown waters to fall from the pier or ship and discharge to adjacent waters. Scuppers onboard ships can be present on all decks and ship compartments, depending on the ship configurations. For example, ships always have scuppers on top decks for rain and sea splashing. Some older ships may also have scuppers and/or drains in areas such as the kitchen or engine rooms for other nonroutine clean-up discharges that may be appropriate out at sea, but not inside harbors or on rivers.

POTENTIAL POLLUTANTS

Potential pollutants such as oils, abrasives, paints, solvents, process dusts and numerous other production related chemicals could exit the pier or ship through scuppers and drains and enter adjacent surface waters. Good environmental practices will help minimize the potential for pollution.

GOOD ENVIRONMENTAL PRACTICES

AWARENESS AND IMPROVED PROCEDURES

- ♦ All employees who work on piers and shipboard decks and work with hazardous materials should be aware of drains and deck scupper locations in their area.
- ♦ Pier scuppers and drains should be inspected and cleaned on a regular basis to ensure that they are operational, visible, and visibly clear.
- ♦ It is a good idea to mark pier scuppers and drains for increased awareness. Similarly, when scuppers are located inside compartments of concern, workers should take actions to educate others in the area of the risk of potential discharge.
- ♦ Handling potential pollutants should be performed away from pier scuppers and drains, in secondary containment area, and/or plugged scuppers and drains.

PIER AND DECK SCUPPERS AND DRAINS

NOTES:

- ♦ If appropriate, actions should be taken to block scuppers and drains if there is a high potential for spills (i.e. during liquid transfer or movement).

EMPLOYEE RESPONSIBILITY

- ♦ It is each employee's responsibility to know where potential spill pathways (scuppers and drains in this case) are in their specific work areas.
- ♦ During onboard work, individuals working with liquids should always be aware of all drain and scupper locations. These drains and scuppers leading to adjacent surface waters should be plugged when liquid systems are being repaired and or changed.

NO WATER WASHDOWN

- ♦ Water washdown of decks and piers should never occur without direct consent of the shipyard Environmental Manager.

PIER AND DECK SCUPPERS AND DRAINS (Cont.)

NOTES:

OBJECTIVE

To ensure that flush and test waters used for piping systems and tanks are not discharged to surface waters, storm drains, or other pollution pathways.

TEST AND FLUSH WASTEWATER DISCHARGE

During construction and repair of vessels, it is often necessary for piping systems and tanks to be flushed and/or pressure tested. Systems are usually flushed and tested with either salt water, fresh water or a chemical solution designed to clean the piping system.

POTENTIAL CONTAMINANTS

Flush waters frequently contain additives that make the water caustic, which enhances the water's cleaning abilities. The caustic water flows through the piping system to loosen dirt, grease, flux, oils, metal shavings, and a variety of other containment that accumulate in piping systems during construction. Even if the flush water does not contain additives, the fresh water flush is intended to loosen and remove debris and contaminants in the piping system or tank. These waters are potentially dangerous and generally should not be discharged to receiving waters. Similarly, these waters should not be discharged to the sewer system without proper prior approval. In some cases, local surface water is used for pressure testing tanks and compartments. When approved in the shipyard NPDES permit, these waters, only used for tank integrity testing, can be discharged back into the receiving waters.

GOOD ENVIRONMENTAL PRACTICES

PROPER PROCEDURES FOR TEST AND FLUSH WATERS

- ♦ Set up proper procedures to ensure that pipe testing and flushing waters are discharged properly in accordance with the facility NPDES permit and local industrial sewer rules.
- ♦ Do not discharge test and flush waters to bilges, ballast tanks or other compartments without proper approval. Contaminated pipe flushing waters can cause excessive contamination of larger supplies of water and cause all of the liquid to become hazardous and to be treated as such. Increasing the quantity of hazardous waste can be a costly mistake for the shipyard.

PIPE AND TANK TESTING AND FLUSH WATERS

NOTES:

DOCK FLOOR DISCHARGES

- ♦ Piping flush and test waters are not to be discharged to dock floors without proper approval. Procedures for dock floor discharge should be identified and followed.

NO DUMPING

- ♦ Pipe flushing and testing waters and tank integrity testing waters shall not be discharged directly to surface water, storm drains, sewer connections, or water treatment systems without proper authorization and approval. This is generally accomplished through a discharge request procedure.

PROCESS IMPROVEMENTS

- ♦ When possible, perform pressure tests on systems with clean water and clean piping systems. Always remember, if the waters discharge to a hazardous material (i.e. dirty bilge water) supply, it will create a larger supply of hazardous materials to treat and dispose.
- ♦ All chemical additives that are used in flush/test water must be approved prior to use. This will help eliminate chemicals that can not be treated easily before disposal into the sewer system.

PIPE AND TANK TESTING AND FLUSH WATERS (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To ensure that contaminated wash water from fresh and salt water washdown of vessels does not enter adjacent surface waters.

The removal of dust and dirt from the hull surfaces of vessels dry-docked is often required prior to hull repair, surface preparation and painting. Removal of this dust and dirt is frequently accomplished by low pressure spray washing of the hull. High pressure water wash is generally designed to remove more than dust and dirt. High pressure and low pressure spray techniques can potentially generate large volumes of wash water. Wash water runoff is usually collected through a series of channels, sumps, pumps, and tanks. Wash water that is contaminated by the cleaning process or by coming into contact with pollutants is sent to some type of wastewater treatment facility.

This wash water has the potential for becoming contaminated and transporting polluted runoff to adjacent surface waters if not controlled properly. Water that is not considered to be contaminated with “pollutants”, can generally be discharged to adjacent surface waters if it is identified in the shipyard’s NPDES permit. For example, when the dry-dock floor is clean, and free of contaminants (soaps, solvents, paint overspray, grit blast, etc.) and the wash water pressure is less than 150 psi, the water is generally considered to be “uncontaminated”. Keeping the pressure below 150 psi helps to prevent the removal of marine growth and paint chips, which are considered pollutants if discharged.

GOOD ENVIRONMENTAL PRACTICES

LOW PRESSURE WATER WASHDOWN

- ♦ Set-up procedures to identify how low pressure wash waters are to be managed in the shipyard. This will help to minimize the likelihood of improper discharge.
- ♦ Wash water drainage areas are to be at least broom clean to ensure that the wash water does not become contaminated by pollutants on the dock floor.
- ♦ Other waste water sources and discharges should not occur on the dock floor during low pressure water washdown.

WATER WASHDOWN CONTAINMENT AND CONTROL

NOTES:

- ♦ Do not add chemical additives to the wash water and maintain pressure at less than 150 psi. If identified as such in the NPDES permit, this wash water can be discharged to adjacent surface waters.

HIGH PRESSURE WATER WASHDOWN

- ♦ If wash water is used to remove marine growth and/or paint chips, it must not be discharged to adjacent waters without treatment.
- ♦ Ensure that wash water is contained properly to eliminate contact with other pollutants and provide the necessary treatment. Containment of wash water is generally accomplished through channels, trenches, berms, curtains, and barker tanks.
- ♦ Other waste water source (bilge water, ballast water, etc.) discharges should not occur on the dock floor during high pressure water washdown.

INSPECTIONS AND SYSTEM MONITORING

- ♦ Continuously monitor berm containment and water flow systems during all phases of vessel washdown to ensure control of wash water.

DISCHARGE NOTIFICATION

- ♦ Notification and approval is to be given by environmental engineering prior to any discharge of wash water to adjacent surface waters.

WATER WASHDOWN CONTAINMENT AND CONTROL

NOTES:

OBJECTIVE

To properly contain, collect, and discharge all steam cleaning effluents.

STEAM CLEANING AND POTENTIAL CONTAMINANTS

During construction and repair of vessels, it is necessary to steam clean various parts and equipment. Steam cleaning is usually accomplished inside a designated steam cleaning area (or pit). Steam cleaning pits usually have a steam cleaner unit, a bermed area, a containment curtain, a collection sump/pump, oil/water separator, and a discharge point to the local sewer. Steam cleaning units can pose a significant threat of polluting surface waters and the grounds through discharging oil, grease, detergents and a variety of other pollutants. Shipyard steam cleaning units are generally located in and around machine shops, maintenance shops, electrical shops, pipe shops and several other production support shops.

GOOD ENVIRONMENTAL PRACTICES

CONTAINMENT

- ♦ All steam cleaning units should have a secondary containment system in place (berm, catch basin, sump). The containment system is used to control and collect the steam cleaning process water.
- ♦ Ensure that all steam cleaning effluent stays inside the bermed area. This is accomplished with a variety of walls, screens and curtains. The curtains should be integrated with the containment berm.

OVERFILL ALARMS

- ♦ Any holding tanks related to the system should be equipped with overflow protection (alarms, level detection floats, switches, etc.).
- ♦ All steam cleaning effluents must be collected and treated prior to discharge to the sewer.

STEAM CLEANING IN THE SHIPYARD

NOTES:

STORM WATER ISSUES

- ♦ Storm water shall not be allowed to enter the steam cleaning area. This can be accomplished with a systems of berms and a cover over the steam cleaning area.

MAINTENANCE AND TANK CLEAN-OUT

- ♦ All steam cleaning effluents and sludge build-up shall be disposed of properly in accordance with all state, local and federal environmental rules and regulations.
- ♦ The oil/water separator associated with the tank should have a set of preventative maintenance practices associated with proper operation and prevention of failures that can result in improper discharges to the surface waters or the sewer system.

ADDITIVES

- ♦ Detergents and/or solvents used in the steam cleaning areas must be approved by environmental engineering.

NO DUMPING INTO STEAM CLEANING PITS

- ♦ Do not dump waste oil, gas, hydraulic fluid, transmission fluid into the steam cleaning area.

STEAM CLEANING IN THE SHIPYARD (Cont.)

NOTES:

OBJECTIVE

To ensure that accidental spills or other floatables lost to adjacent waters are contained and cleaned up efficiently.

OIL CONTAINMENT BOOMS

Oil containment booms are long floating walls that protrude approximately 3 feet below the water's surface and one foot above. The containment booms are easy to spot, because they are usually orange and are placed around ships berthed in the shipyard. Oil containment booms are designed and used to contain pollutants should there be an accidental spillage. Oil booms are generally positioned around ships where work is to be performed. When booms are positioned around ships, it is easier to determine what pollutant has spilled and where the pollutant originated. Similarly, oil containment booms are usually on-shore ready to be deployed to contain an accidental spill, if one was to occur. Booms serve to prevent the spilled pollutants from migrating over a large area which aids in the clean up process.

GOOD ENVIRONMENTAL PRACTICES

CONTAINMENT SCENARIOS

- ♦ Position oil containment booms around all vessels that are berthed at the facility under repair or otherwise pose a threat or potential for discharges to waters.
- ♦ Containment booms should be deployed around the ends of the floating dry-dock whenever a vessel in the dry dock is hanging over the dock surface and under repair.
- ♦ Position containment booms near and around berths and piers whenever repair and other support processes, or conditions present a potential of a spill to surface waters.
- ♦ Containment booms should always be positioned around floats and working barges when over-water work is performed.
- ♦ Containment booms should be deployed around all tank barges and ships when bulk fluid transfer (pumping, discharges, transfers, etc.) and other functions are performed.

OIL CONTAINMENT BOOM DEPLOYMENT

NOTES:

BOOM MAINTENANCE

- ♦ Any breaks or discontinuities in containment booms surrounding all berthed vessels shall be repaired immediately. Similarly, sinking booms that are rendered ineffective should be repaired or replaced immediately.
- ♦ Booms require maintenance removal of marine growth. This cleaning process should be conducted in conformance with state, local, and federal regulations.

EDUCATION AND INSPECTIONS

- ♦ All personnel responsible for the deployment of containment booms shall be knowledgeable of the locations of storm outfalls in case a spill occurs near a storm drain.
- ♦ Once booms are in place, it is a good practice to frequently inspect the containment to ensure that it is in working order. At times, booms can either come loose at the ends or sink, especially in rough weather conditions.

EMERGENCY READINESS

- ♦ Keep reserve containment booms on-site and ready to deploy should a spill require additional containment. Booms may need to be deployed at storm water outfalls if a spill is released into the storm water conveyance system.
- ♦ A crew of employees should be trained and ready to respond to spill emergencies that reach the surface waters. Deployment usually involves the use of a small boat and properly trained employees.

OIL CONTAINMENT BOOM DEPLOYMENT

NOTES:

OBJECTIVE

To prevent discharges of contaminated bilge and ballast water to adjacent surface water and also prevent unauthorized discharges to sewer connections.

VESSEL DISCHARGES

Vessels berthed or dry-docked for repairs generally are carrying bilge and/or ballast water that must be discharged, treated or otherwise disposed. Ballast water is typically sea-water that has been pumped into the ship's ballast tanks to provide necessary vessel stabilization. On the other hand, bilge water is typically water that collects in the lower compartments of the ship and is most often contaminated with solvents, oils, and heavy lubricants discharged from machinery. Contaminated bilge water is caused by leaking pipes, valves, pumps, and other system fittings. As with all processes involving the transfer of liquids, there is a high potential for spills for which good environmental practices must be established.

GOOD ENVIRONMENTAL PRACTICES

NO CONTAMINATED DISCHARGE TO SURFACE WATERS

- ♦ Bilge water and contaminated ballast water must be discharged through ports and piping systems connected to treatment units, storage tanks, and/or the local sewer system. In many cases, contaminated bilge and ballast waters must be treated to remove the potential pollutants prior to discharge into local sewer connections.
- ♦ Contaminated bilge and ballast water shall not be discharged to adjacent surface waters or to storm drains under any circumstances. Procedures must be established and followed that ensure proper discharge.
- ♦ All ballast waters must be checked for contamination prior to discharge. If contamination is discovered in the ballast water, the water should not be discharged to surface waters.

CONTROLLING BILGE AND BALLAST WATERS

NOTES:

UNCONTAMINATED BALLAST WATER CONTROL

- ♦ Uncontaminated ballast waters can generally be discharged back into surface waters because this process is allowed inside ports, rivers and close to shore, although ballast water should be inspected for contamination prior to discharge.
- ♦ Develop procedures to determine if ballast waters are contaminated and determine proper discharge requirements.
- ♦ Ensure that clean ballast waters do not become contaminated prior to discharge into surface waters. For example, ensure that dock floor is clean if ballast water is to discharge on dock floor.

IMPROVED PRACTICES

- ♦ Remove ballast water from holding tanks and compartments as soon as practicable to minimize the potential for contamination caused by shipyard repair activities.
- ♦ Remove all bilge and ballast water from holding tanks and compartments as soon as practicable to minimize accidental mixing of wastes with another more potential hazardous material.

INSPECTIONS AND MAINTENANCE

- ♦ All piping, hoses, pumps and equipment must be inspected routinely for leaks and other damage. Repair all defective equipment immediately upon discovery.

CONTAINMENT BOOM DEPLOYMENT

- ♦ Booms shall be placed around all berthed vessels and barges to maximize containment of potential spills that may occur during bilge and ballast water discharge processes.

CONTROLLING BILGE AND BALLAST WATERS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To ensure that all industrial waste water is disposed in accordance with local, state, and federal regulations and the policies and practices of the shipyard.

POTENTIAL POLLUTION PATHWAY

Industrial waste water in the shipbuilding industry is defined as those contaminated waters that are generated during the course of industrial activities (i.e. hydrostatic testing, treated bilge water, boiler blowdown, steam cleaning waters, etc.). Much of the process waste water is polluted with oil, grease, dirt, rust, metal shavings, and a variety of other pollutants. Therefore, all industrial waste water in the shipyard must be managed properly in order to ensure that it is not improperly discharged to the adjacent state waters or improperly discharged to the industrial sewer without proper authority. Discharging contaminated industrial waste water to receiving waters or the sewer is prohibited by law. Good environmental practices will help identify the appropriate methods for waste water control and disposal.

GOOD ENVIRONMENTAL PRACTICES

IDENTIFY WASTE WATER SOURCES IN YOUR AREA

- ♦ Perform investigations in your area to identify what process waste waters have developed. These waste waters could include cooling water, contaminated rain water, heat treatment water, industrial process clean-up and a variety of others.
- ♦ Departments are to identify and ensure that all industrial waste water sources are analyzed and approved for discharge to the sewer, waste water treatment facility, or to adjacent surface waters.
- ♦ Once waste water sources are identified, procedures and practices must be defined that ensure proper control and discharge.
- ♦ Responsibilities should be defined and all procedures should include approval by the environmental department.

INDUSTRIAL WASTE WATER DISCHARGE CONTROL

NOTES:

TREATMENT REQUIREMENTS

- ♦ In many cases, industrial waste water needs to be collected and treated prior to discharge into the sewer system. Procedures for proper waste water control will identify treatment requirements.

NO DISCHARGE WITHOUT AUTHORITY AND NOTIFICATION

- ♦ There shall be no discharge of industrial waste water into sinks, toilets, storm drains, or to adjacent surface waters without approval from the environmental department.
- ♦ All discharges to the sewer, waste water treatment system and/or surface waters must first have procedures prepared by the responsible department and approval by shipyard environmental department.

REPORTING UNAUTHORIZED DISCHARGES

- ♦ All unauthorized discharges to the adjacent surface waters shall be reported to the on-site spill notification phone extension as spills. Similarly, improper discharges to the sewer system should also be reported internally.

INDUSTRIAL WASTE WATER DISCHARGE CONTROL

(Cont.)

NOTES:

OBJECTIVE

To minimize the potential for sanitary waste water (gray and black) from ships to become uncontrolled and enter adjacent surface waters.

SHIPBOARD SANITARY WASTE WATER

Sanitary waste water systems on-board ships under repair generally need to be operational while in the shipyard. In many cases, operation is required because the ships force remains on-board the vessel and the ship must remain operational. This usually means that the ships sanitary waste water (gray and black) must be connected to a land, pier, and/or dock based sewer connection. Gray water from vessels consists of wastewater that is generated from various locations within the ship including showers, lavatory water, laundry detergent water and some kitchen waters. Black water is usually generated from toilet wastes and other kitchen waste waters. Gray and black waste water are sometimes combined prior to discharge and both waters are transferred to the dock sewer connection. Both sanitary wastewater and gray water are taken from vessels and pumped directly to the sewer or in some cases transferred to tanks prior to discharge.

GOOD ENVIRONMENTAL PRACTICES

PROCEDURE DEVELOPMENT

- ♦ Set up procedures to ensure that the ships sanitary and gray water system is connected to the shipyards “land based” sewage system immediately upon arrival to eliminate any potential discharges to adjacent waters in the shipyard.
- ♦ If a “land based” sewage system is not readily available, the ship’s sewage system should be disengaged and shut-off during repairs to ensure that there is no discharge to surface waters. At times it may be appropriate to utilize septic haulers when a connection is not accessible and systems need to be operational.

ZERO DISCHARGE

- ♦ No sanitary waste water or gray water shall be discharged to adjacent surface waters. If such a discharge occurs, it must be reported as a spill.

CONTROLLING SANITARY WASTEWATER FROM SHIPBOARD SYSTEMS

NOTES:

OBJECTIVE

Ensure the all discharges from saltwater fire systems are a non-contact process and free of potential pollutants.

SHIPYARD AND SHIPBOARD FIRE SYSTEMS

Shipyard saltwater fire systems are designed to supply saltwater to vessels berthed at the shipyard. The systems use saltwater from adjacent surface waters, which is then pressurized and circulated in a piping system to a level that meets fire fighting requirements. Pumps distribute saltwater to vessels through piping systems at piers, berths, graving dock, floating dry-dock, and the building ways. The saltwater is returned to adjacent surface waters through discharge points on vessels and at the end of piers. The discharge of salt water to adjacent surface waters through the fire systems is considered non-contact. Non-contact means that the water does not come into contact with pollutants and is not used for flushing. For example, using sea water to cool a ship's engine is considered non-contact because cooling water simply flows through steel and is used as a heat exchanger.

GOOD ENVIRONMENTAL PRACTICES

ENSURE THE FOLLOWING

- ♦ No chemical additives such as chlorine are to be introduced into the saltwater fire systems.
- ♦ All saltwater fire water shall not come into contact with any external equipment, machinery, or manufacturing/repair processes.
- ♦ Ensure that all saltwater fire systems (pumps and piping) are properly maintained to prevent the buildup of scale and corrosion.
- ♦ Repair all leaks in the saltwater fire systems that can wash pollutants into adjacent water.
- ♦ When flushing these shipboard and facility fire systems of scale rust etc., ensure that the "flush" water is not discharged to adjacent waters unless it is identified and authorized by the environmental department.

SHIPYARD

**SALTWATER FIRE
SYSTEMS**

NOTES:

- ♦ No discharge of sanitary waste water or gray water to the dock floor or to pier surfaces.

IMPROVED PRACTICES

- ♦ Remove all gray water and sanitary wastewater from all system tanks as soon as practicable to minimize accidental discharge or mixing of the waste with another material.

ROUTINE INSPECTIONS

- ♦ All piping, valves, and pumps must be water tight. All leaks must be repaired immediately. Perform routine inspections of all transfer systems and equipment while the ship is docked.

SECONDARY CONTAINMENT

- ♦ Containment systems (i.e. berms, drip pans, absorbent material, drums, etc.) must be made available to contain potential spills around hose connections and sewage tanks.
- ♦ When breaking hose connections, a secondary containment system shall always be in place, with special attention given to the locations of storm drains and the distance to adjacent surface waters.

CONTAINMENT BOOM DEPLOYMENT

- ♦ Booms shall be placed around all moored or stationary vessels, barges, and lighters to contain potential spills during the transfer of sanitary waste water and gray water.

CONTROLLING SANITARY WASTEWATER FROM SHIPBOARD SYSTEMS (Cont.)

NOTES:

ENVIRONMENTAL TRAINING MODULES

MODULE 2

Shipyard Craft Specific Training

HAZARDOUS MATERIALS
AND WASTE

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

**HAZARDOUS MATERIALS AND WASTE
TABLE OF CONTENTS**

HAZARDOUS MATERIALS IN THE SHIPYARD (1-HZ-MATS.DOC)

OBJECTIVE - To describe what hazardous materials are, their usage in the shipyard, and Material Safety Data Sheets (MSDS').

HAZARDOUS MATERIAL CONTAINER LABELS (2-LABEL.DOC)

OBJECTIVE - To explain and understand hazardous material labels to better determine how to protect yourself and the environment.

HAZARDOUS MATERIALS PRE-PURCHASE SCREENING (3-SCREEN.DOC)

OBJECTIVE - To describe in detail how hazardous materials are brought into the shipyard and identify methods for hazardous materials control.

PURCHASING HAZARDOUS MATERIALS (4-PURCH.DOC)

OBJECTIVE - To purchase hazardous materials prudently and ensure that they have been reviewed by Safety and Environmental before they are ordered.

RECOGNIZING HAZARDOUS WASTE (5-WASTE.DOC)

OBJECTIVE - To recognize and identify hazardous wastes for proper handling and disposal practices and procedures.

HAZARDOUS WASTE ACCUMULATION (6-ACCUM.DOC)

OBJECTIVE - To understand the waste accumulation process and associated practices and procedures for compliance, safety and environmental protection.

PROPER DISPOSAL AND CONTROL OF EMPTY CONTAINERS (7-EMPTY.DOC)

OBJECTIVE - To ensure that empty containers are disposed of in an appropriate and efficient manner.

HAZARDOUS MATERIALS AND WASTES STORAGE AREAS (8-HZ-STR.DOC)

OBJECTIVE - To provide storage areas for hazardous materials and hazardous wastes.

<i>CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES</i>
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OIL STORAGE & CONTAINMENT (9-OIL-ST.DOC)

OBJECTIVE - To ensure proper storage of oil and oily waste water in the shipyard.

HANDLING HAZARDOUS WASTES (10-HANDL.DOC)

OBJECTIVE - To understand proper handling of hazardous wastes to prevent personal injuries, environmental spills, and other hazardous incidents.

MARKING & LABELING HAZARDOUS WASTES (11-MARK.DOC)

OBJECTIVE - To understand proper marking and labeling of hazardous waste containers for accumulation and transportation.

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OBJECTIVE - To understand the importance of proper in-yard transportation of hazardous waste and ensure efforts to minimize spills and associated hazardous incidents.

CRADLE TO GRAVE RESPONSIBILITY (13-CADL.DOC)

OBJECTIVE - To explain the importance of proper hazardous material disposal and the role of hazardous waste Transporters and Treatment, Storage, Disposal and Recycling Facilities (TSDRFs).

SPILL CLEAN-UP AND RESPONSE PLANNING (14-SPILL.DOC)

OBJECTIVE - To identify and follow procedures and practices for spill response and cleaning-up small spills.

**ENVIRONMENTAL INCIDENT REPORTING AND INTERNAL RESPONSE SYSTEM
(15-REPOR.DOC)**

OBJECTIVE - To understand spill and environmental incident reporting procedures and practices in the shipyard and become familiar with the emergency response plan.

**EXTERNAL ENVIRONMENTAL REPORTING AND REPORTABLE QUANTITIES (Rqs)
(16-RQS.DOC)**

OBJECTIVE - To identify responsibilities with respect to external reporting of environmental emergencies, spills and other hazardous materials incidents and to understand “Reportable Quantities” (RQs).

OBJECTIVE

To describe what hazardous materials are, their usage in the shipyard, and Material Safety Data Sheets (MSDS').

Understanding and identifying hazards associated with handling hazardous materials in the shipyard is very important for your safety. Chemicals are an essential part of our lives, at home and at work. Generally, a hazardous material is any chemical that has the potential for producing harm to human health or the environment. Mishandling or misusing of these chemicals can cause injuries and environmental damages. Proper identification of hazardous materials and the knowledge about them can and will prevent personal injuries or damages to the environment.

WHAT ARE HAZARDOUS MATERIALS?

Shipyards use hazardous materials and generate hazardous waste. They are considered hazardous because of their chemical, physical or toxic properties. These materials are an integral part of shipyard operations and are needed to provide shipbuilding and repair operations. A few examples of these materials are paints, solvents, waste oil, spent blasting media and plating solutions. Because of the concern for employee health and the environment, these materials must be handled in accordance with governmental regulations and shipyard policies and practices.

Chemicals can be categorized according to the specific hazards they present. For instance, some chemicals, such as sulfuric acid or caustic soda, cause a burn if they contact human skin. Other chemicals, such as trichloroethane or lead, can cause bodily harm after long term exposures. Still others, such as, acetone and toluene, can ignite readily and present a serious fire hazard. More information on these and other chemical hazards will be discussed later in this training program.

HAZARDOUS MATERIAL USAGE IN THE SHIPYARD

Many areas and departments in the shipyard store and use hazardous materials. It must be stressed that all departments must follow the practices for chemical safety, which are in accordance with government regulation and good health and safety policies.

Hazardous materials, when used may eventually become hazardous waste and will need to be disposed of in an environmentally sound manner. As persons responsible for ensuring that hazardous wastes are properly prepared for disposal, you must be familiar with the hazardous materials in your area and how they must be managed.

HAZARDOUS MATERIALS IN THE SHIPYARD

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

HAZARD COMMUNICATION REFRESHER

The chemical manufacturer or importer is responsible for determining if the chemical presents any physical or health hazard. This information is available to you on the proper container label and the Material Safety Data Sheet (MSDS). Therefore, the container label and MSDS are the best sources for obtaining any hazards associated with using the material. So, **READ THEM** before working with paints, solvents, paint removers, and other hazardous materials .

The MSDS provides the most detailed information on the hazardous materials you use. An MSDS is available for every chemical used and/or stored at your work area. Know the location where the MSDS's are kept and read them carefully.

You may find the MSDS's come in various formats. However, they should all have the following basic information. The information presented is meant to serve as a review of basic Hazardous Communication training.

MSDS SECTION	INFORMATION
Identification	Lists the manufacturer's name, address, emergency phone number, the chemical name, and the date the MSDS was prepared.
Hazardous Ingredients or Components	Lists components that make up the chemical, permissible exposure limits (PEL), and threshold limit values (TLV).
Physical and Chemical Characteristics	Lists the chemical's appearance and odor, boiling point, melting point, specific gravity, vapor density, and other data.
Fire and Explosion Hazard	Lists flash point, flammable limits, fire fighting procedures and proper extinguishing agents.
Reactivity Data	Lists if the chemical is stable or unstable.
Health Hazard Data	Includes the hazards associated with the chemical, the different routes of entry into the body, whether the effects of exposure will be short-term or long-term, symptoms of exposure, and proper first aid procedure.
Special Precautions	Includes any special handling and storage requirements, response procedures in an event of release or spill, and proper disposal methods.
Control Measures	Includes any engineering controls and personal protective equipment.

HAZARDOUS MATERIALS IN THE SHIPYARD

(Cont.)

NOTES:

OBJECTIVE

To explain and understand hazardous material labels to better determine how to protect yourself and the environment.

HAZARDOUS CONTAINER LABELS

All containers of hazardous chemicals that enter the shipyard must have a label. The label is your primary source of information regarding the hazards of a chemical. Generally, you will find the following information on the label:

- ♦ Identity or name of the chemical
- ♦ Signal Word - DANGER!, WARNING!, or CAUTION!
- ♦ Name and address of manufacturer or importer
- ♦ Physical and health hazard warnings
- ♦ Potential target organs.
- ♦ Instructions in case of contact or exposure
- ♦ Antidotes
- ♦ Instructions in case of fire, spill, or leak
- ♦ Instructions for handling and storage

THE SIGNAL WORD LABEL

The "SIGNAL WORD" alerts the person using the chemical to the level of the hazard associated with using the material. The choice of the signal word depends on the nature of the material, its concentration and the degree of harm exposure will cause. Glacial acetic acid, for example, is approximately 100% acetic acid and presents an immediate threat of injury upon exposure. This same compound, however, is packaged as a dilute solution (3% acetic acid) and is commonly called vinegar. Persons using chemicals at work or in the home must understand "**SIGNAL WORDS**" and always refer to them as an immediate guide for handling a chemical.

HAZARDOUS MATERIAL CONTAINER LABELS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

When used to identify FIRE HAZARDS, the SIGNAL WORD has the following meanings:

SIGNAL WORD" Example	STATEMENT OF HAZARD	FLAMMABILITY LEVEL
DANGER! Gasoline	EXTREMELY FLAMMABLE	Flashpoint below 20°F
WARNING! Toluene	FLAMMABLE	Flashpoint between 20°F and 100°F
CAUTION! Diesel Fuel	COMBUSTIBLE	Flashpoint between 100°F and 200°F

Persons using chemicals should always identify the "**SIGNAL WORD**" and the "**STATEMENT OF THE HAZARD**" prior to using the material. This must be done every time the chemical is used.

TYPICAL STATEMENTS OF HAZARD:

- a) MAY BE FATAL IF SWALLOWED
- b) HARMFUL IF SWALLOWED
- c) MAY BE FATAL IF INHALED
- d) MAY BE FATAL IF ABSORBED THROUGH SKIN
- e) HARMFUL IF INHALED
- f) MAY CAUSE ALLERGIC RESPIRATORY REACTION
- g) CAUSES SEVERE BURNS
- h) EXTREMELY FLAMMABLE
- i) CAUSES IRRITATION - CAUSES SKIN ALLERGIC REACTION - FLAMMABLE
- j) CONTACT WITH ACID LIBERATES POISONOUS GAS
- k) HIGHLY VOLATILE
- l) CONTACT WITH WATER MAY CAUSE FLASH FIRE
- n) POWERFUL OXIDIZER
- m) MAY FORM EXPLOSIVE PEROXIDES

HAZARDOUS MATERIAL CONTAINER LABELS (Cont.)

NOTES:

FOUR (4) TYPES OF CONTAINER LABELS

Four main types of container labeling systems are used in industry:

- 1) American National Standards Institute (ANSI)**
- 2) Department of Transportation (DOT)**
- 3) National Fire Prevention Association (NFPA)**
- 4) Hazardous Material Information System (HMIS)**

1) AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

The ANSI label uses mainly words to communicate information. It lists the physical and health hazards, including the target organ effects. The level of hazard (signal word) is printed on the upper left side of the label. The signal words and their meaning are:

- ***DANGER:*** Serious hazard
- ***WARNING:*** Less hazardous but still severe
- ***CAUTION:*** Moderate hazard but still of concern

2) DEPARTMENT OF TRANSPORTATION (DOT) LABELS

DOT labels are diamond shaped. Colors and symbols are used to represent the hazards:

<u>HAZARD</u>	=	<u>COLOR</u>
<i>EXPLOSIVE</i>	=	<i>ORANGE</i>
<i>FLAMMABLE GAS OR LIQUID</i>	=	<i>RED</i>
<i>FLAMMABLE SOLID</i>	=	<i>RED STRIPED</i>
<i>NON-FLAMMABLE GAS</i>	=	<i>GREEN</i>
<i>COMBUSTIBLE</i>	=	<i>RED</i>
<i>OXIDIZER</i>	=	<i>YELLOW</i>
<i>POISON OR TOXIC GAS</i>	=	<i>WHITE</i>
<i>RADIOACTIVE</i>	=	<i>YELLOW & WHITE</i>
<i>CORROSIVE</i>	=	<i>BLACK & WHITE</i>

**HAZARDOUS
MATERIAL
CONTAINER
LABELS**
(Cont.)

NOTES:

DIAGRAM - DOT label

3) NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

The NFPA labeling system is mainly intended to convey hazard information concerning chemical products to fire fighters. The hazards of a chemical in a fire can be substantially different than the hazards using a chemical in a controlled type of situation.

The NFPA uses four color-coded diamonds to communicate the hazards. The numbers represent the degree of hazard. The hazards are rated on a scale of zero to four. Zero or one means none, or minimal hazard, and a four represents a high or severe hazard.

Diagram - NFPA Label

4) HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

The HMIS labeling system shows the degree of hazard of a chemical under normal usage conditions. The HMIS label lists the chemical name, health hazard, flammability, reactivity, and personal protective equipment. A number, from zero to four, represents the degree of severity for the hazard. Letters used show the recommended personal protective equipment.

Diagram - HMIS label

**HAZARDOUS
MATERIAL
CONTAINER
LABELS
(Cont.)**

NOTES:

GOOD ENVIRONMENTAL PRACTICES

FREQUENTLY REFER TO HAZARD LABELS

The first time a person handles a chemical, and whenever a significant period has passed since the information has been reviewed, they **MUST READ THE DETAILED PRECAUTIONARY INFORMATION** on the label. This information will tell you:

- ♦ **What Is The Hazard**
- ♦ **How To Avoid The Hazard**
- ♦ **How To Recognize Exposure**
- ♦ **What TO Do In Case Of Exposure**
- ♦ **How To Handle Spills and Accidents**

IDENTIFY THE CHEMICAL THREE TIMES

Persons using chemicals at home or work must get into the habit of identifying a chemical at least three times:

- 1) ONCE BEFORE THE CONTAINER IS REMOVED FROM STORAGE**
- 2) ONCE BEFORE THE CONTAINER IS OPENED**
- 3) ONCE BEFORE THE CONTENTS ARE POURED OR USED**

HAZARDOUS MATERIAL CONTAINER LABELS

(Cont.)

NOTES:

OBJECTIVE

To describe in detail how hazardous materials are brought into the shipyard and identify methods for hazardous materials control.

PRE-PURCHASE ENVIRONMENTAL & SAFETY REVIEW

When hazardous materials are purchased and used in the shipyard, the Material Safety Data Sheet (MSDS) usually goes through a review process involving an evaluation of compliance with Environmental and Safety policies.

The hazardous material must obviously meet all production specifications for its intended use. Similarly, the hazardous materials must also meet shipyard environmental and safety constraints and policies. The environmental and safety review checks for strictly regulated hazardous and toxic materials and usually approves the hazardous material before the hazardous material is ordered. Many shipyards have performed great efforts to reduce or eliminate the use of many regulated materials such as ozone depleting substances (ODSs), xylene containing solvents, and lead based hazardous materials. Hazardous materials and solvent only need to be reviewed for safety and environmental concerns when they are ordered for the first time. For example, “Hazardous material F-111” or “Zinc Primer XXX” may be purchased as needed once the products have been through the initial safety and environmental reviews.

SAFETY REVIEW

It is very important that all hazardous materials brought into the shipyard are first reviewed and approved by the Safety Department. In many cases, the shipyard has determined specific safety policies with respect to what hazardous chemicals will be brought on-site in the shipyard. Hazardous materials can be dangerous to the hazardous materials craft personnel. The safety review of the MSDS prior to purchase may save time and many problems by highlighting and bringing attention to specific hazards associated with the hazardous material. The craft personnel can then be notified of any special hazards and procedures associated with all new hazardous materials. Usually, workers will be made aware of safety and environmental concerns at “gang-box” meetings.

HAZARDOUS MATERIALS PRE-PURCHASE SCREENING

NOTES:

ENVIRONMENTAL DEPARTMENT REVIEW

Hazardous materials, by definition, are potentially harmful to the environment. Therefore an environmental review is necessary to assess the potential environmental problems and prescribe protective measures. The environmental review is mainly concerned with air quality compliance, hazardous waste issues, and the potential for pollution of the land and water. Additionally the use of the hazardous material review system provides up-front information that enables the environmental personnel to maintain compliance with legal requirements and reports, such as:

- ♦ SARA Title III, Section 313 releases & reportable quantities.
- ♦ Federal, State, and Local Hazardous Materials Regulations
- ♦ 1990 CAA Air Toxics
- ♦ OSHA mandated Material Safety Data Sheet Control
- ♦ RCRA, Hazardous Waste Manifesting

The Environmental Review of Hazardous Materials Can Include the Following:

1) Volatile Organic Compounds (VOCs)

VOCs generally identify how much solvent is in the hazardous material. The solvent portion of the hazardous material evaporates as the hazardous material dries, causing VOC emissions. These VOC emissions combined with nitrogen oxide form what we commonly refer to as smog. Many shipyards have limits on the VOC content of hazardous materials and/or total VOC emissions. If a hazardous material is used that is over the legal VOC limit, the shipyard is out of compliance and would be given a notice of violation (NOV) and fined.

HAZARDOUS MATERIALS PRE-PURCHASE SCREENING

(Cont.)

NOTES:

2) Ozone Depleting Substances (ODSs)

Shipyards are phasing out the use of ODSs. ODSs are suspected of causing what is referred to as “Global Warming” and “Stratospheric Ozone Depletion.” ODSs are used as components in some hazardous materials and solvents, although there has been a major effort to replace them with non-ODS solvents. The environmental review seeks to ensure that a minimal amount, if any, of ODSs are used in hazardous materials and for solvent cleaning operations in the shipyard.

3) Toxic Chemicals

Many toxic substances found in hazardous materials are regulated by federal, state and local environmental agencies. These environmental regulations may require chemical reporting, spill contingency plans, and an assortment of other requirements depending on the chemical. Shipyards seek to minimize their environmental liabilities by minimizing the amount, toxicity, and variety of chemical used in the shipyard. By reducing the amount of toxic chemicals in the shipyard, we can minimize the amount of reporting and other regulatory burdens, which in general, saves time, increases employee safety and reduces overall environmental liability.

4) Insecticides and Hazardous Metals

Many antifouling coatings contain insecticides such as Tributyltin (TBT), and potentially hazardous metals such as lead, copper and zinc. In some coating types, these components may be undesirable and require special environmental precautions.

SUMMARY

Setting-up and following a system of procedures and practices to pre-screen hazardous materials before they are purchased and delivered to the shipyard is very important for environmental compliance and personal safety. It is always a good idea if the process of checking MSDS’ is centralized and performed by one or two responsible individuals. This will add an extra element of hazardous material safety to the shipyard the will be beneficial to all.

HAZARDOUS MATERIALS

PRE-PURCHASE SCREENING

(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To purchase hazardous materials prudently and ensure that they have been reviewed by Safety and Environmental before they are ordered.

PURCHASING THE HAZARDOUS MATERIAL

Once the material been approved for purchase, the hazardous material Department should log the MSDS into their “Master MSDS Book” which contains all hazardous materials used by the Department in the shipyard.

REQUESTING THE MSDS WITH SHIPMENT

Once a hazardous material has been approved by safety and environmental, a hazardous material purchase order is placed. It is always a good idea to request the MSDS with shipment by including a caption on the order form that states “Supply MSDS With Shipment”. This will help to ensure that workers at the receiving dock will have immediate access to the MSDS if a spill or other hazardous incident should occur. Similarly, when the hazardous material is transported to an in-yard hazardous material storage area, a copy of the MSDS can be put into the “AREA MSDS Book.”

HAZARDOUS MATERIALS PROPER PACKAGING

All hazardous materials within the shipyard should be received with proper packaging to minimize the likelihood for spills. If hazardous products arrive with improper or damaged packaging, procedures are in-place to contain the product and return it to the supplier. Damaged or leaking containers should be repaired or replace with a proper container prior to transportation. These procedures are outline specifically the “Transportation Crafts Environmental Training Manual.” The original containers should be utilized throughout in-yard transportation until the material becomes a waste.

DO NOT OVER ORDER MATERIALS

One important task that a buyer faces is making hazardous material purchases. Hazardous material purchasing agents can minimize many environmental liabilities associated with hazardous materials and significantly reduce costs associated with hazardous material materials and wastes, by practicing prudent buying.

PURCHASING HAZARDOUS MATERIALS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

Hazardous material purchasers should avoid ordering more hazardous materials than needed. Do not over-order hazardous material materials. All cost savings realized by ordering in bulk quantities can be diminished by one spill incident and associated clean-up efforts. Also, a large inventory of hazardous materials may increase the local permit fees. In many cases, expired material may need to be managed as hazardous wastes, which is costly and increases the company liabilities. It is always a good idea to exchange or return hazardous materials before the shelf-life expires.

Many shipyard hazardous materials crafts adopt a Just-In-Time (JIT) approach to inventory control. The shipyard may organize a ordering and delivery system with the hazardous material supplier that allows the shipyard to request hazardous materials on an as needed basis. This can often make delivery quantities more manageable and reduce the likelihood for spills and other accidents.

GOOD ENVIRONMENTAL PRACTICES

- ♦ Ensure that materials brought into the shipyard are acceptable with regard to the safety and the environment departments.
- ♦ Ensure that all individuals involved with ordering hazardous materials are aware of MSDS environmental and safety review.
- ♦ Ensure that materials brought into the shipyard that require a Material Safety Data Sheet have one on-site and in each department that uses the material.
- ♦ Ensure proper handling, storage, and transportation of hazardous materials.
- ♦ Attempt standardization and consolidation of hazardous materials.

PURCHASING HAZARDOUS MATERIALS (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To recognize and identify hazardous wastes for proper handling and disposal practices and procedures.

RECOGNIZING HAZARDOUS WASTE

Can you tell the difference between a hazardous waste and non-hazardous waste?

Recognizing a hazardous waste is not an easy task. You can't tell a hazardous waste by just looking at it, unless it is labeled as such. Hazardous wastes come in a liquid, solid, gaseous, or sludge form. The U.S. Environmental Protection Agency (EPA) defines the criteria for determining what is a hazardous waste. Also, many states have their own more stringent rules for defining hazardous waste.

REGULATORY DEFINITION OF WASTE

The regulatory definition of a hazardous waste is so specific that it appears complex. However, once understood, it makes the determination of hazardous waste rather simple. The Environmental Protection Agency (EPA) has defined solid wastes and hazardous wastes in Title 40 of the Code of Federal Regulations (40 CFR). This is presented as a series of flow charts which can be used to determine the regulatory status of industrial waste stream. The charts illustrate the decision logic that should be followed to determine if a material is generated into a hazardous waste.

Environmental Coordinators need to properly identify and label hazardous wastes generated in their area during accumulation, storage, and prior to transporting to the main waste accumulation/reclamation area. The time and money required for reclamation workers to identify and segregate your area wastes can be saved by simply placing the correct information on each drum and the accompanying paperwork.

RECOGNIZING HAZARDOUS WASTE

NOTES:

NEED decision flow chart

DETERMINE IF IT IS A HAZARDOUS WASTE

Regulatory classifying of waste streams is the responsibility appropriately trained and tasked shipyard personnel. They will determine how each waste stream generated in the shipyard needs to be classified. Waste classification information can be obtained from them, which will be used for identification to simplify the drum labeling of wastes.

How do you determine if your waste is a hazardous waste?

You can start the determination process by answering the following:

1. IS THE WASTE LISTED?

The EPA publishes lists of hazardous wastes that are commonly generated in industry. These lists are found in the Code of Federal Regulations, 40 CFR. Spent 1,1,1 trichloroethane degreasing solvent, cyanide plating bath solution, and wastewater treatment sludge are examples of the listed hazardous wastes. You can start the waste determination process by checking these lists first.

2. CHARACTERISTIC HAZARDOUS WASTE

Any waste exhibiting any of the four following characteristics is a hazardous waste:

Is it Ignitable? - An ignitable waste has a flash point of lower than 140 degrees Fahrenheit, such as spent acetone.

Is it Corrosive? - A corrosive waste has a pH of less than 2 or greater than 12.5, such as spent sulfuric acid or caustic soda.

Is it Reactive? - A reactive waste is unstable, explosive, or water reactive, such as nitroglycerin.

Is it Toxic? - A toxic waste has a contaminant whose concentration is equal to or greater than the limit set forth by EPA. An example could be a broken and spilled mercury thermometer.

Keep in mind that non-hazardous materials can become hazardous waste if they come in contact with, or are mixed with a hazardous waste.

RECOGNIZING HAZARDOUS WASTE

(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To understand the waste accumulation process and associated practices and procedures for compliance, safety and environmental protection.

HAZARDOUS WASTE ACCUMULATION

Understanding the importance of proper management of paint associated hazardous wastes in accumulation areas is very important to the shipyard's environmental compliance. The EPA has established requirements for accumulation and storage of hazardous wastes in Central Accumulation and Satellite Accumulation Areas.

Environmental Coordinators are responsible for managing their Satellite Accumulation Areas. Satellite Accumulation Areas must be in compliance with all Environmental and Safety regulations and not present any unnecessary hazards. By following good environmental practices and procedures that meet regulatory requirements, the accumulation areas can be managed properly.

CENTRAL ACCUMULATION OR GENERAL ACCUMULATION AREAS

The Central Accumulation Area is sometimes referred to as the Reclamation Area or General Accumulator Area. This is the area in the shipyard where hazardous waste is transported to be processed and packaged for off-site disposal or recycling. This area may involve tanks, drums, and other containers from waste streams throughout the shipyard. This area can accumulate hazardous waste for 90 days or less. The 90-day clock starts when the waste is transported to the area.

SATELLITE ACCUMULATION AREAS

There are several Satellite Accumulation Areas in the shipyard. Each area of the shipyard that generates a hazardous waste or wastes is referred to as a "Satellite Accumulation Area". Waste is accumulated in each area in amounts up to 55 gallons for each waste stream. The waste is under the control of the Environmental Coordinator and should always be very near the point of generation. You should be very familiar with the waste streams and processes associated with your area and how your satellite area is managed.

This waste is later transported to the Central Accumulation Area for further processing and ultimate disposal or recycling. The department generating the waste must accumulate and store the waste from its area in compliance with environmental and safety requirements.

HAZARDOUS WASTE ACCUMULATION

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

REGULATORY REQUIREMENTS

Federal and State regulations provide for the safe accumulation of hazardous waste prior to its shipment off-site. They also provide that a generator may only accumulate waste for a limited time before it must be shipped off-site. The accumulation time for waste storage in the Satellite Areas is specified in EPA Regulations (40 CFR 265, Subpart I).

Only one container is allowed for each waste stream in the Satellite Accumulation Area. The initial accumulation start date must be clearly marked and visible on each container along with the words "HAZARDOUS WASTE", the company name, and the identity of the material. Pre-printed labels are available that have the Shipyard name on them. The Environmental Coordinator needs to fill in the rest of the required information. When the container becomes filled, the container must be re-labeled within three days with the new accumulation start date.

GOOD ENVIRONMENTAL PRACTICES

CONTAINER CONDITIONS AND SIZE REQUIREMENTS

- ♦ The containers must be in good condition; no dents and dings; if damage is present or occurs, do not use the container. All lids must fit securely.
- ♦ The containers must be compatible with the waste. Incompatible wastes can not be stored in the same container or in unwashed containers that previously held an incompatible material. All containers of waste must be separated from incompatible materials by a dike, berm, wall or other separating device.
- ♦ The container must be kept closed, except when adding or removing wastes. Tap the lids shut and install the drum rings. This will help prevent releases of vapors to the atmosphere and the potential of spillage if an accident should occur. Clean up any spills on or around drums when transferring wastes and materials.
- ♦ Generally, only container sizes of 55 gallons or less are to be used for accumulating waste.
- ♦ The total amount of a single type of hazardous waste in the Satellite Accumulation Area shall not exceed 55 gallons.

HAZARDOUS WASTE ACCUMULATION (Cont.)

NOTES:

AREA INSPECTIONS

- ♦ The areas must be inspected at least weekly for leaking or deterioration of the containers and the secondary containment system. Check drums regularly for any leaks or damages.
- ♦ Ensure good housekeeping in accumulation areas.
- ♦ Keep emergency equipment (fire extinguishers, booms, and absorbent materials, etc.), an emergency communication system, and emergency phone numbers close to the area.

SECONDARY CONTAINMENT

- ♦ Secondary containment must be provided for all containers of hazardous materials and hazardous waste.

ACCUMULATION SITE REQUIREMENTS

Departments generating the waste will determine the quantity and nature of the waste to be disposed and proper waste handling procedures for that waste. Information about materials and wastes is derived from appropriate Material Safety Data Sheets and assistance from the Environmental and Safety Departments. General requirements that apply to all storage areas include the following:

- ♦ Ignitable or reactive materials are stored at least 50 feet from the property line.
- ♦ Clearly identify the accumulation area with posted signs and warning placards. Limit access to the accumulation area to those who require access.
- ♦ Properly mark and label all accumulation drums. Write the accumulation start date on the label.
- ♦ Each container of waste shall have a Hazardous Waste Accumulation Label (see example label) affixed to it before waste is placed into the container. The Hazardous Waste Accumulation Label is white with a red boarder.

HAZARDOUS WASTE ACCUMULATION (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ Hazardous Waste Coordinators must also handle and manage *Excluded Recyclable Materials*. These materials are legally recyclable. These materials have a different type of label affixed before accumulation. Excluded Recyclable Materials include: solvents, bag-house waste, and spent abrasives. The label should have the following information:
 - a. The words “Excluded Recyclable Material”
 - b. The accumulation start date
 - c. The container contents
 - d. The physical state of the waste
 - e. The hazardous properties of the waste

TRAINING REQUIREMENTS

- ♦ All persons involved with hazardous waste handling must receive safety and hazardous materials training. It is the Departmental Supervisor's responsibility for each department to ensure that the employees receive this training.
- ♦ All persons in the shipyard who are involved in the handling of hazardous waste must be aware of the reporting procedures outlined later.

The department generating waste is responsible for ensuring that containers with hazardous wastes are properly stored and prepared for transportation to the hazardous waste yard. Following the shipyard guidelines for Satellite Accumulation Areas, as outlined below, will ensure compliance with federal regulation (40 CFR 265, Subpart I).

HAZARDOUS WASTE ACCUMULATION (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To ensure that empty containers are disposed of in an appropriate and efficient manner.

Containers that previously held hazardous materials are exempt from further regulation after certain conditions are met. Two of the most important conditions is that they must be "empty" and "properly managed". The regulatory definition of "empty" is based on the type of hazardous material that the container previously held and the quantity of the material left in the container. Proper management usually includes ensuring that the containers are empty prior to disposal and that materials disposed are treated as hazardous waste.

DEFINITIONS OF EMPTY CONTAINER

In many cases, containers are classified as empty for disposal purposes because of what they previously held and the ability to remove previous contaminants. For example, paints are a mildly hazardous material that flow fairly easily and dry hard, therefore "empty" is usually defined as less than 1/4 inch of material left on the bottom of a five gallon container.

GOOD ENVIRONMENTAL PRACTICES

GUIDELINES FOR DETERMINING EMPTY

The following three items should be used as a guideline for determining "empty" for nonhazardous disposal:

1. If the container held a material that can be easily poured, then all material left in the container must be removed by any means possible, such as pumping, aspirating, or draining. Removed material should be accumulated in an adequate container that will be labeled for accumulation. Examples include paint, oil, varnish, solvent, and cosmoline.
2. If the material is non-pourable, then all material that can be feasibly removed by physical means such as scraping, chipping and wiping, must be removed. Examples of non-pourable materials include zinc dust, tar, and composite fibers.

PROPER DISPOSAL AND CONTROL OF EMPTY CONTAINERS

NOTES:

3. If the container held an acute or extremely hazardous material or waste, the container shall be triple rinsed using a cleaner capable of removing the material. Shipyard examples include acids and cyanide.

OTHER EMPTY CONTAINER ISSUES

- ♦ All empty cans and drums that previously held hazardous materials are to be sent to the main hazardous waste accumulation area for processing.
- ♦ Ensure that the containers are empty and any waste material has been accumulated in a designated hazardous waste accumulation containers.
- ♦ Palletize empty containers and secure the load with plastic wrap and/or straps. Fill out a hazardous waste transportation form and notify transportation.
- ♦ Ensure that containers are empty before stacking or palletizing. If a container at the bottom of a stack is not empty, it may cause an undue potential for improper disposal as an empty container.
- ♦ Empty aerosol containers must be disposed of in the same manner as cans and drums. Therefore, they should be accumulated in a bag or drum and transported to the main hazardous waste area for consolidation and disposal.
- ♦ Empty containers must not be reused to store materials or chemicals, unless the container has been re-conditioned and properly labeled.

PROPER DISPOSAL AND CONTROL OF EMPTY CONTAINERS

NOTES:

OBJECTIVE

To provide storage areas for hazardous materials and hazardous wastes.

Shipyards utilize and generate a wide variety of hazardous materials and wastes that need special attention with respect to storage area configuration and management. Hazardous materials such as oils, paints, solvents, grit blast media and others require storage in special locations that reduce the probability that they do not enter pathways leading to surface waters or the soil.

GOOD ENVIRONMENTAL PRACTICES

CONTAINER CONDITION AND HANDLING

- ♦ Containers holding hazardous materials/wastes must be in good condition with no visible signs of severe rust or with any apparent structural defects.
- ♦ If a container begins to leak, the contents of the container must be transferred to a container in good condition.
- ♦ All containers must always be closed during storage, except when it is necessary to add or remove material/waste.
- ♦ All containers must be handled and/or stored in a manner as to prevent ruptures to containers or cause leaks.
- ♦ Keep all containers in the waste accumulation area closed unless adding or removing operations are in process.

AREA MANAGEMENT

- ♦ Clearly identify the accumulation area with posted signs and warning placards.
- ♦ Limit access to the accumulation area to those individuals in the shipyard who are required access.

HAZARDOUS MATERIALS AND WASTES STORAGE AREAS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ Ensure that all accumulation drums and other wastes are properly marked and labeled. Write the accumulation start date on the label.
- ♦ Inspect and check drums regularly for any leaks or other damages that could occur during transportation and use.
- ♦ Always ensure good housekeeping practices are followed in the waste accumulation areas.
- ♦ Keep emergency equipment (fire extinguishers, booms, and absorbent materials), an emergency communication system, and emergency phone #s.

MATERIAL/WASTE COMPATIBILITY

- ♦ Hazardous materials/wastes that are incompatible must not be stored in close proximity, and if applicable, must have separate secondary containment systems.

INSPECTIONS

- ♦ The containment systems/areas must be periodically checked to ensure tightness and integrity.

STORAGE AREA MARKING

- ♦ Hazardous material/waste storage areas must be adequately posted/placarded or otherwise made distinguishable in order to maximize the awareness of hazards.

SECONDARY CONTAINMENT

- ♦ Secondary containment systems should always be used when storing hazardous materials/wastes.

HAZARDOUS MATERIALS AND WASTES STORAGE AREAS

(Cont.)

OBJECTIVE

To ensure proper storage of oil and oily waste water in the shipyard.

OIL STORAGE PROCESSES IN THE SHIPYARD

Shipyards frequently process, transport, store, and/or use large quantities of oil and oily waste water. Fuel oil, bilge water, steam cleaning, and tank cleaning wastewater from vessels and maintenance operations are the primary sources of generation. Much of this material must be stored in containers that are adequate enough to protect the environment and ensure that any spillage from such containers cannot soak into underlying soils or enter nearby surface waters.

Oil/water separators are a type of waste water treatment facility frequently found in shipyards. They are utilized by shipyards for the treatment of oils and disposing of wastewater. The recovered oil is stored in either above ground holding tanks, barges, or tank trucks. In most cases, the recovered oil is transported to an oil recycling facility, where the oil will be recycled into a useable product.

GOOD ENVIRONMENTAL PRACTICES

OIL/WATER SEPARATOR SECONDARY CONTAINMENT

- ♦ Since oil and waste oil are generally considered to be potentially hazardous materials, they should be stored in an area that can contain the material in the event of a spill or tank/connection leakage. If appropriate, the storage system/area should be encompassed by a curb, dike, berm or some other type of secondary containment to provide sufficient volume to contain possible spills and overflows. Also, it is a good idea to have overfill protection alarms to signal when a potential spill is going to occur.

**OIL STORAGE &
CONTAINMENT**

NOTES:

SPILL CLEAN-UP

- ♦ An array of oil clean-up materials should be kept near oil storage and containment areas. The area environmental coordinator must be knowledgeable of the uses of clean-up materials. The containment systems/areas must be periodically checked to ensure system integrity and cleanness.
- ♦ If a significant amount of oil has spilled and entered adjacent surface waters, oil booms must be deployed to aid in the containment and clean-up of the oil. For further information, see Good Environmental Practices on Oil Containment Booms.

UNDERGROUND STORAGE

- ♦ If storage tanks are below ground, records must be kept indicating the results of tank integrity tests. Underground storage tanks have special regulations and the shipyard must ensure compliance.

OIL STORAGE & CONTAINMENT (Cont.)

NOTES:

OBJECTIVE

To understand proper handling of hazardous wastes to prevent personal injuries, environmental spills, and other hazardous incidents.

There are some simple steps that can be taken to minimize the potential for pollution, accidents, and potential injuries when handling hazardous wastes. Handling generally includes all movement and transfer of old hazardous materials to accumulation tanks or drums. Planning and organization are the key to good environmental practices.

GOOD ENVIRONMENTAL PRACTICES

WASTE AREA MANAGEMENT

- ♦ Ensure where you perform waste transfer is well ventilated, or if in-doors, contains a ventilation exhaust system.
- ♦ Keep sources of heat, flames, and sparks away from all hazardous wastes.
- ♦ Use secondary containment systems when possible during transfer operations and other handling functions.

WASTE HANDLING PRACTICES

- ♦ Prevent splashes by always using a funnel or a pump system to transfer liquids to and from cans and drums.
- ♦ Do not mix a hazardous waste with a nonhazardous waste. If you mix a pint of waste degreasing solvent into a drum of clean solvent, the whole drum is now considered a hazardous waste.
- ♦ Never mix two hazardous wastes unless you are positive they are compatible. Mixing acidic waste with a waste containing sulfide can create an explosive waste.

HANDLING HAZARDOUS WASTES

NOTES:

CONTAINER MANAGEMENT

- ♦ Check hazardous waste drums regularly and before handling and transferring operations. Check for rust, dents, leaks and other potential damage.
- ♦ Do not use damaged drums. If a drum becomes damaged, take steps to empty the drum contents or put the damaged drum into an over-pack container.
- ♦ Always tighten bung caps before moving a 55-gallon drum of hazardous waste.
- ♦ Use straps or other forms of restraint to securely hold the drum in place during transportation to minimize the potential for accidents.
- ♦ Ensure that all drums are compatible with the waste that they are to hold.
- ♦ Use drum liners that are compatible with the waste when appropriate, to help prevent leaks and reuse drums.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- ♦ Know the HAZARDS associated with the waste and ensure you are using the proper personal protective equipment (PPE). If you are unsure, contact the Safety Department immediately.
- ♦ Always use personal protective equipment when transferring or handling hazardous wastes.
- ♦ PPE generally includes goggles, glasses, gloves and proper clothing.

LEVELS OF PERSONAL PROTECTIVE EQUIPMENT

Understand the different levels of personal protective equipment needed for working with hazardous wastes. There are four progressive levels of personal protective equipment that hazardous waste personnel should be familiar with.

HANDLING HAZARDOUS WASTES

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

Level A

Full-body enclosure (moon suits). Used when you need the highest level of respiratory and skin protection, or when you are dealing with an unknown substance.

Level B

Self-contained breathing apparatus (SCBA) for complete supplied-air breathing and comprehensive skin protection. Use when working with toxic materials and areas where breathing would be very difficult (e.g. enclosed blasting and painting).

Level C

Chemical skin protection and air-purifying respirator.

Level D

Minimal skin protection, no respiratory protection. Includes gloves, safety glasses, and steel toed shoes.

Most Environmental Coordinators who work around hazardous waste need either Level C or Level D protection on a continuous basis.

NOTE: Always Check With Safety if You Are Unsure of The Proper Hazardous Chemical PPE.

HANDLING HAZARDOUS WASTES

NOTES:

OBJECTIVE

To understand proper marking and labeling of hazardous waste containers for accumulation and transportation.

Environmental Coordinators must understand proper marking and labeling of hazardous waste containers during accumulation and in-yard transportation. Wastes must be properly marked to show the contents and generator information for transportation to final disposal or recycling at a Treatment, Storage, Disposal, and Recycling (TSDR) facility.

MARKING AND LABELING HAZARDOUS WASTES

Hazardous waste containers in accumulation, storage, or transport to a Treatment, Storage, and Disposal Facility (TSDF) must be properly marked to show the contents and generator information.

The US EPA requires all hazardous waste containers to be marked with:

- ♦ “Hazardous Waste. Federal law prohibits improper disposal. If found, contact the nearest police or public safety authority, or the U.S. Environmental Protection Agency”.
- ♦ Generator's name and address
- ♦ Manifest number
- ♦ Accumulation start date
- ♦ Proper DOT shipping name
- ♦ UN or NA number

Also, any required DOT hazard class labels must be affixed on the container. See Figure 1 for an example of preprinted marking form.

Many shipyards prefer to use a separate preprinted marking form for the satellite accumulation. See Figure 2 for an example of satellite accumulation marking form.

MARKING & LABELING HAZARDOUS WASTES

NOTES:

**MARKING &
LABELING
HAZARDOUS
WASTES**

EXAMPLE LABEL ?

NOTES:

Figure 1. Example of Preprinted Marking Form

Figure 2. Example of Satellite Accumulation Marking Form

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To understand the importance of proper in-yard transportation of hazardous waste and ensure efforts to minimize spills and associated hazardous incidents.

IN-YARD TRANSPORTATION OF HAZARDOUS WASTE

Hazardous waste is transported throughout the shipyard on a day to day basis. Waste is transported from the generation site to the satellite accumulation area and from the satellite accumulation area to the central waste processing area. Transportation is accomplished using a wide variety of equipment including dollies, forklifts, cranes and carts. This movement of waste can lead to accidental spills if the waste is not properly packaged.

GOOD ENVIRONMENTAL PRACTICES

PACKAGING WASTE FOR IN-YARD TRANSPORTATION

- ♦ In many cases, proper packaging will require the waste to be shrink wrapped, strapped or otherwise secured to the transportation pallet.
- ♦ It is always a good idea to package pallets such that they are not over-loaded. Over-loaded pallets are an accident waiting to happen. A general rule of thumb is that 5 gallon cans should not be stacked over 3 cans high.
- ♦ The Environmental Coordinator who packages the waste should perform a series of stability tests prior to transportation. Stability tests are meant to imitate conditions experienced by the load on a forklift. Stability tests could include simple shaking, pushing, and pulling efforts that test the load packaging.

WASTE GENERATION/TRANSPORTATION FORM

- ♦ A Waste Generation Form (See FORM) shall be completed by the Environmental Coordinator generating the waste and affixed to the container prior to transfer to the central accumulation area. The Waste Transportation Form will be filled out at the same time the end accumulation date is put on the Hazardous Waste sticker.

IN-YARD TRANSPORTATION OF HAZARDOUS WASTE

NOTES:

TIME REQUIREMENTS FOR ACCUMULATED WASTE

- ♦ When the waste accumulation container becomes full, the container must be prepared for transportation to the central accumulation area. The end accumulation date must be written on the Hazardous Waste Sticker. Once the end accumulation date is entered on the Hazardous Waste Sticker, you have three (3) days to transport the container to the central accumulation area. The satellite accumulation container cannot stay in the shipyard for more than one year. Therefore, the Shipyard has a policy of not allowing satellite wastes to accumulate for over nine (9) months. This gives the central accumulation area 90 days to dispose of the waste properly.
- ♦ The department generating the waste shall notify the Transportation and the Reclamation departments after the waste is properly prepared for transport.

**IN-YARD
TRANSPORTATION
OF HAZARDOUS
WASTE**

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

Shipyards Hazardous Waste Transportation Form

Section 1) To be Completed by Waste Accumulation Area (Only):

Destination: _____

Date:(Also Put Date On Outside of Packing Slip): _____

From (Shop, Area, Ship, etc.): _____, **Department**

Name: _____

Responsible Supervisor: _____,

Badge #: _____, **Phone:** _____

Waste Information: Fill rows A, B, & C for each waste type shipped to Waste Area on this pallet.

<u>Description of Waste:</u> (Paint Sludge, Acid, Solvent, Rags, Aerosol Cans, etc.)	<u>Volume of Waste:</u> (Gallons, Lbs, etc.)	<u>Container Type:</u> (1 gal can, 55 gal drum, etc.)	<u>Hazardous Properties:</u> Flammable, Corrosive,Explosive, Etc.)
A)			
B)			
C)			

Section 2) To be Completed by the Central Accumulation Area (only):

Date Received by Waste Area: _____ **Date Processed by Waste Area:** _____

<u>Waste Description:</u> (Actual Waste Description)	<u>Actual Quantity Of Waste:</u>	<u>Comments:</u>
A)		
B)		
C)		

**IN-YARD
TRANSPORTATION
OF HAZARDOUS
WASTE (cont'd)**

NOTES:

OBJECTIVE

To explain the importance of proper hazardous material disposal and the role of hazardous waste Transporters and Treatment, Storage, Disposal and Recycling Facilities (TSDRFs).

OFF-SITE HAZARDOUS WASTE TRANSPORTERS

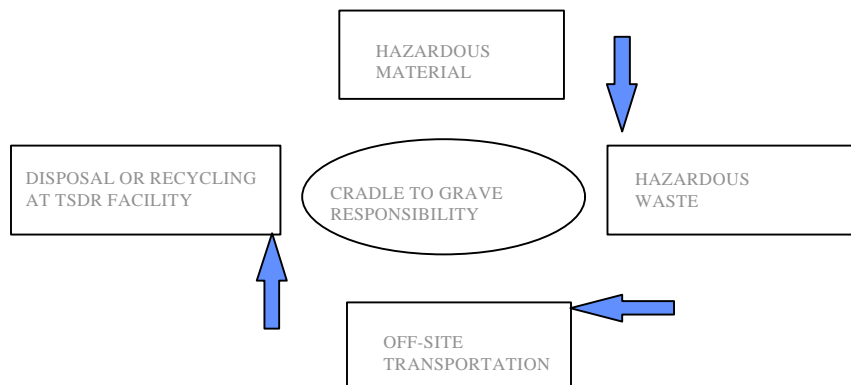
The shipyard contracts with licensed companies to transport their hazardous waste. Hazardous waste haulers, transporters, or shippers are licensed in the states in which they are operating, and must operate their equipment in accordance with Department of Transportation (DOT) Regulations.

Using licensed transporters does not release the shipyard from liability. In fact, the shipyard is liable for the waste it generates forever. If the waste ends up in a location that contaminates the soil or water, the shipyard may have to pay to have the area cleaned-up. Environmental clean-ups can run in the millions of dollars.

TREATMENT, STORAGE, DISPOSAL AND RECYCLING FACILITIES (TSDRFs)

Shipyards contract with Treatment, Storage, Disposal and Recycling Facilities (TSDRF's) that meet regulatory requirements and use safe operating practices when handling hazardous wastes. For that reason, the Environmental Department has developed a program to audit and pre-approve all TSDF's and waste transporters that handle the shipyard's hazardous waste. This allows Environmental to uncover inadequacies that may exist before they cause problems. Contractors who cannot handle the hazardous waste disposal needs or meet shipyard policies, will not be allowed to operate on the site.

CRADLE TO GRAVE RESPONSIBILITY



CRADLE TO GRAVE RESPONSIBILITY

NOTES:

OBJECTIVE

To identify and follow procedures and practices for spill response and cleaning-up small spills.

ACCIDENTS HAPPEN

Even when precautionary measures to prevent spills are taken, accidents happen and hazardous materials are occasionally spilled. The response to a spill occurs at several levels. Sometimes a spill in the production yard can be cleaned-up safely by workers in the area, (i.e. those who created the spill). On the other hand, some spills must be managed by the designated spill response team.

In a practical sense, the quantity of chemical is only one third of the picture. The hazardous nature of the chemical and the location of the spill must also be considered in determining whether the situation is beyond the control of the area worker.

Experience provides some guidelines for deciding whether a spill should be cleaned-up by personnel in the yard or by the spill response team. For convenience and safety, a minimum quantity beyond which all chemical spills, regardless of the substance, must be reported to on-site emergency responders should be established. The policy generally states that paint spills greater than 1 gallon must be reported to the emergency response department. While this may seem overly stringent to some, experience indicates that over-reporting is preferable to under-reporting. A 1-quart spill of 40-weight oil, for example, can prove risky to clean-up when you consider the slip hazard the oil will create, or the smoke that can be generated if the oil contacts a hot surface.

SPILL RESPONSE PLANNING

The on-site emergency spill response procedures are pre-planned. Following the pre-plan procedures allows for smooth operation and a minimal amount of confusion during the clean-up of the spill. For the same reasons, production yard workers must also have pre-plan procedures for cleaning up small spills that are below reportable levels.

SPILL CLEAN-UP AND RESPONSE PLANNING

NOTES:

GOOD ENVIRONMENTAL PRACTICES

EMPLOYEE SAFETY COMES FIRST

The primary consideration for employees when a chemical is spilled is personal safety. Safety for every person in the area and in the building is of paramount importance. If the spill could potentially harm someone, clear the area and activate the spill response team. Otherwise, the area employees who will clean up the spill must follow specific clean-up procedures safely and effectively.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Before attempting to clean-up a spill, the responder must put on a minimum amount of personal protective equipment (PPE). Appropriate PPE are:

- Splash goggles, not just safety glasses
- Coveralls with the sleeves rolled down
- Nitrile or neoprene gloves - in good condition

CLEAN-UP SUPPLIES

Clean-up supplies are available at various locations throughout the yard. Secure the correct materials before attempting to clean-up a spill. The actual materials used will depend upon the nature and hazards of the spilled material. Several locations in the yard should contain the following materials for spill clean-up:

- 50 lbs of absorbent material
- 1 box polypropylene pads
- 1 box activated carbon
- Liquid acid neutralizer
- Liquid caustic neutralizer
- 1 box heavy duty plastic trash bags
- Hazardous waste labels
- 5 gallon plastic container with lid
- 2 brooms, 1 dust pan & 1 smaller brush
- Laboratory tongs

SPILL CLEAN-UP AND RESPONSE PLANNING (Cont.)

NOTES:

SPILL CLEAN-UP PROCEDURES

After obtaining the clean-up materials and donning personal protective equipment, the following step-wise procedure is followed:

1. STOP THE FLOW

- ♦ Control the source, if it is still present. A bottle, for example, which was knocked over, will still have some chemical in it. The responder should carefully upright the container, place it on a polypropylene pad in a safe location, and replace the lid on the container.

2. CONTROL THE SPREAD

- ♦ This is best done by placing polypropylene pads around and on the spill. The responder must be aware of a liquid's tendency to run down a grade or off a table and should be prepared to block its path with the absorbent pads. If the spill involves broken glass, the spill responder must be careful to avoid getting cut.

3. ABSORB THE FREE LIQUID

Acid, Caustic and Non-Flammable Liquids

- ♦ These are most easily absorbed with polypropylene pads or absorbent material. Place used polypropylene pads or absorbent material in a trash bag. Frequently, spills will spread under pallets and behind equipment. The responder must be careful to locate all such contaminated areas.

Flammable Liquids, Combustibles, Oils and Paints

- ♦ Flammable liquids should be absorbed on activated carbon. Use approximately 2 pounds of activated carbon per pint (0.5 liters) of liquid. Use the dust brush to thoroughly mix the activated carbon with the liquid. Use the dust pan and brush to collect all residue.

Broken Glass

- ♦ Using tongs, or carefully using gloved fingers, remove all large pieces of glass and place them in the plastic container.

SPILL CLEAN-UP AND RESPONSE PLANNING (Cont.)

NOTES:

4. NEUTRALIZE RESIDUES AND DECONTAMINATE THE AREA

Acid Spills

Spray liquid acid neutralizer on all surfaces affected by the spill. Soak up the neutralizer and apply fresh neutralizer.

- ♦ Remove Neutralizer Residue

Caustic Spills

- ♦ Spray liquid caustic neutralizer on all surfaces affected by the spill. Soak up the neutralizer and apply fresh neutralizer.
- ♦ Remove Neutralizer Residue
- ♦ Residue from the neutralization can be easily removed with water. Moisten a pad with water and carefully wipe all contaminated surfaces. Repeat this process until all traces of the neutralizer are removed. If, after the clean-up is completed, the affected area is sticky, use soapy water to remove any remaining neutralizer.
- ♦ Decontaminate Container
- ♦ Use polypropylene pads, neutralizers, and soapy water, as appropriate, to remove all traces of spilled chemical from the container which spilled. Remember to clean the bottom of the container.

5. INSPECT THE AREA

- ♦ Carefully check the entire affected area for spill residue, hidden contamination, or unsafe conditions.

6. PACKAGE AND LABEL THE RESIDUE WASTE

- ♦ Place all spill residue in a plastic bag. Seal the lid on the broken glass container and place the sealed container in the bag. Seal the bag and place a properly completed hazardous waste label on the outside of the bag. Place the bag wherever appropriate for its disposal as a hazardous waste.

7. RESTOCK THE SPILL CLEAN-UP SUPPLIES

- ♦ Talk to your supervisor and order more supplies.

SPILL CLEAN-UP AND RESPONSE PLANNING

(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To understand spill and environmental incident reporting procedures and practices in the shipyard and become familiar with the emergency response plan.

In keeping with the shipyard commitment to safety and environmental protection, a comprehensive program aimed at prevention of injuries, fire and environmental incidents has been implemented throughout the shipyard. If, in spite of all precautionary measures, such an event should occur, the shipyard is prepared with an on-site emergency response team. The emergency response team is capable of resolving most common situations, however, if the situation warrants, the on-site emergency coordinator may request assistance from off-site response companies or agencies. In all incidents, large or small, the emergency response team will have protection of human health and safety as its primary objective.

SHIPYARD ENVIRONMENTAL INCIDENTS

Because of the shipyard's proximity to the surface waters, delayed or improper response to incidents involving hazardous materials or wastes, such as spills, leaks, fire and explosion, can cause a severe effect on the environment. To prepare for incidents involving hazardous materials or wastes, the shipyard has an emergency response plan. The emergency response plan includes the following information:

- ♦ Who to notify during an environmental incident
- ♦ What procedures to follow if an emergency should occur
- ♦ Evacuation routes and gathering areas in the shipyard
- ♦ On-site emergency equipment and response personnel

Review and understand the emergency response plan. Follow the proper procedures in the event an incident involving hazardous waste or materials occurs.

ENVIRONMENTAL INCIDENT REPORTING AND INTERNAL RESPONSE SYSTEM

NOTES:

EMERGENCY TELEPHONE REPORTING

<u>Emergency</u>	<u>Phone Number</u>
Fire or Injury	_____
Large Spills	_____
Small Spills, Leaks and Hazardous Materials Incidents	_____

**ENVIRONMENTAL
INCIDENT
REPORTING AND
INTERNAL
RESPONSE
SYSTEM
(Cont.)**

NOTES:

In most instances, the Shipyard Emergency Response System will be initiated by a telephone report from a shipyard worker. Details of the Shipyard Emergency Response System will be discussed in a subsequent section.

When reporting a spill or other hazardous materials incident to the on-site Security, Fire, Safety or Environmental Department, the caller should be prepared to provide as much information as possible including:

REPORT THE FOLLOWING INFORMATION:

- 1) Caller's Name and Badge Number;**
- 2) The location and extension from which you are calling;**
- 3) Description of the incident (e.g. spill, leak, fire, and injuries, etc.);**
- 4) Location of incident (Building Number, Deck, Frame Compartment, etc.);**
- 5) Other relevant information.**

The caller should stay on the line until advised that notification is complete.

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To identify responsibilities with respect to external reporting of environmental emergencies, spills and other hazardous materials incidents and to understand "Reportable Quantities" (RQs).

EXTERNAL ENVIRONMENTAL REPORTING

Shipyards are required to report certain environmental spills and other hazardous materials releases. Reporting these releases is an important and difficult task. In many cases, the difficulties arise when determining who, what, when, and how to report the spill incident to outside agencies. Reporting is required by several regulations and associated agencies including RCRA, SARA, Coast Guard, Clean Water Act, Clean Air Act, and others.

In general, the shipyard worker should report all information regarding spills to the appropriate shipyard contact. The Environmental Department will determine if outside reporting is required. It is very important that all information provided by workers to the Environmental Department is correct, concise and timely to allow time for external reporting, if required.

REPORTABLE QUANTITIES (RQs)

A reason for reporting all spills through the hazardous materials incident communication is that the government requires employers to track the amount of materials that are released off-site. If the quantity released exceeds this "Reportable Quantity", or RQ, the Environmental Engineering Department will have to take appropriate actions as required by law. A list of chemicals in use and their RQ's is given on the following pages. As you can see, some of the RQ's are quite low. By reporting every chemical spill, regardless of the size, you are helping your company meet its environmental legal obligations.

GOOD ENVIRONMENTAL PRACTICES

- ♦ Environmental Coordinators are to report all spills to the on-site spill reporting phone extension.

**Report All Spills, Leaks and
Hazardous Materials Incidents To
Phone X _____**

EXTERNAL ENVIRONMENTAL REPORTING AND REPORTABLE QUANTITIES (RQs)

NOTES:

ESSENTIALLY, REPORT ALL SPILLS

In addition to the reasons given above, some spills present severe safety hazards to area workers and to the entire facility. These types of spills are listed below.

1. All personal contamination incidents must be reported.
2. All spills that get into the adjacent waters must be reported.
3. All spills which can not be cleaned-up by area workers must be reported.
4. All spills of extremely flammable materials (Example - acetone)
5. All spills of extremely corrosive materials must be reported.
6. All spills of extremely toxic materials must be reported.
7. All leaking containers must be reported.
8. All uncontrolled compressed gas releases must be reported.

DESIGNATED SHIPYARD PERSONNEL PERFORM EXTERNAL REPORTING

- ♦ External release reporting is performed by designated shipyard employees. These employees perform an evaluation to determine if external reporting is required and who the incident should be reported to (i.e. EPA, Port, USCG, etc.). In general, employees that are not designated to perform external reporting, should not report spills or other environmental incidents to external agencies.

REPORTABLE QUANTITIES IN THE SHIPYARD

- ♦ When possible, do not perform operations in the shipyard with the potential of spilling a reportable quantity (RQ). Use smaller lots of materials to perform functions as necessary.

EXTERNAL ENVIRONMENTAL REPORTING AND REPORTABLE QUANTITIES (RQs) (Cont.)

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

CAS #	CHEMICAL NAME	RQ(lb)
50-00-0	FORMALDEHYDE	100
67-19-7	ACETONE	5000
71-55-6	1,1,1-TRICHLOROETHANE	1000
79-55-6	1,1,2-TRICHLOROETHANE	100
79-01-6	TRICHLOROETHYLENE	100
74-87-3	METHYLENE CHLORIDE	1000
7664-41-7	AMMONIA	100
7664-93-9	SULFURIC ACID	1000
7705-08-0	FERRIC CHLORIDE	1000
11115-74-5	CHROMIC ACID	10
7783-06-4	HYDROGEN SULFIDE	100
91-20-3	NAPHTHALENE	100
108-88-3	TOLUENE	1000
1306-19-0	CADMIUM OXIDE	1
1330-20-7	XYLENE	1000
1332-21-4	ASBESTOS	1
1336-21-6	AMMONIUM HYDROXIDE	1000
631-61-8	AMMONIUM ACETATE	5000
7789-09-5	AMMONIUM BICHROMATE	10
7439-92-1	LEAD	1
7440-66-6	ZINC (FUME OR DUST)	1000
7440-50-8	COPPER	5000
7440-22-4	SILVER	1000
7440-47-3	CHROMIUM COMPOUNDS	5000
7440-02-0	NICKEL	100
7440-43-9	CADMIUM METAL	10
7647-01-0	HYDROCHLORIC ACID	5000
7664-39-3	HYDROFLUORIC ACID	100
7722-37-2	NITRIC ACID	1000
7664-38-2	PHOSPHORIC ACID	5000
64-19-7	ACETIC ACID	5000
7782-50-5	CHLORINE	10
1310-73-3	SODIUM HYDROXIDE	1000
143-33-9	SODIUM CYANIDE	10
506-64-9	SILVER CYANIDE	1
151-50-8	POTASSIUM CYANIDE	10
544-92-3	COPPER CYANIDE	10
7761-88-8	SILVER NITRATE	1
123-91-1	1,4-DIOXANE	100
1309-64-4	ANTIMONY TRIOXIDE	1000
127-18-4	PERCHLOROETHYLENE	100
78-93-3	METHYL ETHYL KETONE	5000
108-95-2	PHENOL	1000
67-66-3	CHLOROFORM	10
7726-95-6	BROMINE	1

**EXTERNAL
ENVIRONMENTAL
REPORTING AND
REPORTABLE
QUANTITIES (RQs)**
(Cont.)

NOTES:

ENVIRONMENTAL TRAINING MODULES

MODULE 2

Shipyard Craft Specific Training

OIL AND BULK HAZARDOUS
MATERIAL TRANSFER

**OIL AND BULK HAZARDOUS MATERIAL TRANSFER
TABLE OF CONTENTS**

**INTRODUCTION TO TRANSFER OF OIL AND BULK HAZARDOUS MATERIALS
(1-INTRO.DOC)**

OBJECTIVE To introduce the students to the contents of the training and the learning objectives

LETTER OF INTENT (2-LETTR.DOC)

OBJECTIVE To understand the purpose and requirements of a shipyard facility "Letter of Intent."

**FACILITY REQUIREMENTS, OPERATIONS MANUAL, AND LETTER OF ADEQUACY
(3-OP-MAN.DOC)**

OBJECTIVE To understand the facility requirements imposed by the shipyard operations manual and describe the letter of adequacy.

EQUIPMENT REQUIREMENTS (4-EQUIP.DOC)

OBJECTIVE To understand the equipment requirements associated with transferring oil or hazardous materials in bulk quantity to and from ships and other vessels.

PERSON IN CHARGE QUALIFICATIONS (5-PIC.DOC)

OBJECTIVE To define a shipyard bulk fluid transfer "Persons In Charge" (PIC) and associated qualifications.

SAFETY REQUIREMENTS (6-SAFTY.DOC)

OBJECTIVE To understand safety requirements associated with transferring oil and other bulk hazardous materials to and from ships and other vessels.

RECORDS AND RECORDKEEPING (7-RECORD.DOC)

OBJECTIVE To be aware of records that need to be kept at a shipyard engaged in oil and other bulk hazardous material transferring operations.

PROCEDURES FOR SPILLS, LEAKS AND OTHER INCIDENTS (8-SPILL.DOC)

OBJECTIVE To understand the process for reporting and responding to spills and other incidents during bulk oil and hazardous material transfer operations.

RESPONSE PLAN (9-RPLAN.DOC)

OBJECTIVE To understand the facility oil spill response plan and its requirements.

DECLARATION OF INSPECTION (10-INSPT.DOC)

OBJECTIVE To understand the importance of the declaration of inspection and its requirements.

TRANSFER REQUIREMENTS (11-TRANFR.DOC)

OBJECTIVE To understand the procedural and preparation requirements for transferring oil or hazardous materials from or to a vessel.

POST-TRANSFER REQUIREMENTS (12-PSTRS.DOC)

OBJECTIVE To understand the procedural and post-transfer requirements for transferring oil or hazardous materials from or to a vessel.

POST TEST (13-TEST.DOC)

The U.S. Coast Guard (USCG) and the Department of Transportation (DOT) are the main federal agencies that regulate the transfer operation of oil and hazardous material in bulk over water. This transfer mainly occurs in large and small shipyards and fueling stations. Bulk hazardous material transferred by shipyards can include crude oil, fuel oil, oily waste water, sludge, and a variety of other similar substances. The regulations enforced by the USCG and DOT are developed to ensure safe transfer of oil and hazardous material in bulk to and from vessels. These regulations are outlined in the 33 Code of Federal Regulations (CFR) parts 154 and 156.

Transfer of hazardous materials to and from ships and barges in shipyards is a potentially risky process due to the close proximity to state waters. Failures caused by improper procedures, the lack of procedure adherence and/or equipment failures can result in significant releases to the environment. Releases are known as spills and they cost shipyards significant amounts of time and money. Spills are very expensive to clean-up, can result in excessive fines, and put shipyard employees and the environment at risk.

Training sessions provide the persons in charge of oil or hazardous material transfer and personnel assisting the transfer operation a basic overview of rules and regulations. On the job training will help solidify the learning experience.

PRINCIPAL SUBJECTS COVERED

GENERAL REQUIREMENTS

- ♦ The Letter of Intent to operate a transfer facility
- ♦ The Operations Manual required for the facility
- ♦ The Letter of Adequacy

EQUIPMENT REQUIREMENTS

Hose Assemblies	Loading Arms
Closure Devices	Monitoring Devices
Small Discharge Containment	Discharge Removal
Discharge Containment	Emergency Shutdown
Communications	Lighting

INTRODUCTION TO TRANSFER OF OIL AND BULK HAZARDOUS MATERIALS

NOTES:

FACILITY OPERATIONS

- ♦ Person In Charge Responsibilities and Qualification
- ♦ Person In Charge Evidence of Qualification/Designation
- ♦ Safety procedure requirements
- ♦ Recordkeeping
- ♦ Compliance with Operations Manual

OIL TRANSFER OPERATIONS

- ♦ Person In Charge Limitations
- ♦ Advanced Notice of Transfer Operations
- ♦ Pre and Post Transfer Requirements
- ♦ Connections
- ♦ Declaration of Inspection
- ♦ Equipment Test and Inspections
- ♦ Pre-arrival Notices
- ♦ Reporting Incidents
- ♦ Oil spill response plan and procedures

INTRODUCTION TO TRANSFER OF OIL AND BULK HAZARDOUS MATERIALS (Cont.)

NOTES

WHO NEEDS TRAINING

- ♦ Training is required for all individuals who are in charge of transfer operations for the facility and/or the vessel, and also individuals with direct association with the transfer process and associated equipment.

PURPOSE

- ♦ To ensure that all Persons-In-Charge understand shipyard environmental and safety policies and procedures and all USCG and DOT regulations that cover Oil and Hazardous Material Transfer Operations.

LEARNING OBJECTIVES

After completing all of the training sessions in the module, you will be versed in classroom training on the following subjects:

- ♦ Learn and understand the Rules and Regulations associated with Oil and Hazardous Materials Transfer operations as described in 33 CFR 154 - 156
- ♦ Performing duties and understanding responsibilities as a "Person In Charge" to ensure transfer operations are safe and free of accidents. Proper use of all procedures, equipment, and personal protective equipment (PPE).
- ♦ Performing duties and understanding responsibilities as an assistant to the "Person In Charge" before, during, and after transfer operations.
- ♦ Perform all inspections and evaluation of operations and equipment associated with the transfer process.
- ♦ Respond quickly and accurately to spill related emergencies during transfer operations.

INTRODUCTION TO TRANSFER OF OIL AND BULK HAZARDOUS MATERIALS (Cont.)

OBJECTIVE

To understand the purpose and requirements of a shipyard facility "Letter of Intent."

LETTER OF INTENT

The shipyard must submit a letter of intent to transfer oil or hazardous material to or from floating vessels. This includes all transfers of hazardous materials in bulk quantities to and from all repair or new construction ships. The letter of intent should be submitted to the Captain Of The Port (COTP) not less than 60 days before the intended operations.

The Letter of Intent should include:

- ♦ The name, address, and telephone number of the facility operator
- ♦ The name, address, and telephone number of the facility
- ♦ The geographical location of the facility in relation to the navigable waters.

The facility is not required to resubmit the letter of intent if the letter was submitted previously.

The facility operator must notify the COTP in writing of any changes of information.

**LETTER OF
INTENT****NOTES:**

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To understand the facility requirements imposed by the shipyard operations manual and describe the letter of adequacy.

FACILITY REQUIREMENTS

The shipyard facility must have an operations manual prepared and published as described in 33 CFR 154.3. The operations manual must be submitted to the COTP with the letter of intent.

OPERATIONS MANUAL

The operations manual must include the following subjects:

- ♦ The manual must describe how the shipyard meets the operating rules and equipment requirements as specified in 33 CFR Parts 154 and 156.
- ♦ Describe the responsibilities of personnel involved in transfer operations.
- ♦ The manual must be understood by all designated Persons In Charge of transfer operations on site.
- ♦ Include names of all employees trained and designated as Persons In Charge.
- ♦ The manual must always be current and up-to-date.
- ♦ Be ready and available for immediate examination by the COTP if requested

LETTER OF ADEQUACY

Upon completion of a full review of the operations manual, the COTP issues a letter of adequacy to the facility operator. The letter of adequacy certifies that the operations manual meets the requirements of the USCG regulations.

FACILITY REQUIREMENTS, OPERATIONS MANUAL, AND LETTER OF ADEQUACY

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To understand the equipment requirements associated with transferring oil or hazardous materials in bulk quantity to and from ships and other vessels.

EQUIPMENT REQUIREMENTS

HOSE ASSEMBLY (33 CFR 154.5)

Hose assembly equipment is very important for the prevention of accidents because many problems encountered during transfer operations can be the result of improper equipment, inconsistencies, or equipment failures.

Each hose assembly used for transferring oil or hazardous material must meet the following requirements:

- ♦ Must meet the minimum design burst pressure of 600 psi.
- ♦ The maximum allowable working pressure (MAWP) for the hose must be at least 150 psi.
- ♦ Each non-metallic hose must be usable for oil or hazardous material service.
- ♦ Each hose assembly must have either:
 - 1) full threaded connections; steel, brass, or bronze flanges that meet American National Standards Institute (ANSI) standards.
 - 2) quick-disconnect couplings that meet ASTM F-1122.

HOSE ASSEMBLY MARKING

- ♦ Each hose must be marked with: the name of each product for which the hose is used, or "OIL SERVICE" for oil products, or "HAZMAT SERVICE-SEE LIST" for hazardous materials.
- ♦ Each hose also must be marked with: the maximum allowable working pressure; date of manufacture; and date of the latest hydrostatic test.

EQUIPMENT REQUIREMENTS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ The date of manufacture and the date of the latest hydrostatic test need not be marked on the hose or in records and the hose is marked to identify it with that information.
- ♦ The hose burst pressure and the hydrostatic testing pressure must not also be marked on the hose. Keep the pressure records with the hose records.
- ♦ An automatic back pressure shutoff nozzle must be on each hose used for transferring fuel to a vessel that has a fill pipe for which containment can not practically be provided.

LOADING ARMS (33 CFR 154.5)

Each mechanical loading arm used for transferring oil or hazardous material must meet the following requirements:

- ♦ Must meet the design, fabrication, material, inspection, and testing requirements of ANSI B.
- ♦ Must have the manufacturer's certification marked on the loading arm or recorded at the facility.
- ♦ Must have a means of being drained or closed before being disconnected upon completion of transfer operations.

CLOSURE DEVICES (33 CFR 154.52)

- ♦ The facility must have enough butterfly valves, wafer-type resilient seated valves, blank flanges, or other means acceptable to the COTP to blank off the ends of each hose that is not connected for the transfer of oil or hazardous material.
- ♦ New and/or unused hose is exempt from this requirement if it is not connected to the facility, to the vessels, or any section of the pumping system.

EQUIPMENT REQUIREMENTS (Cont.)

NOTES:

MONITORING DEVICES (33 CFR 154.53)

The COTP may require the facility to install monitoring devices if:

- ♦ The environmental sensitivity of the area requires added protection.
- ♦ The products being transferred pose a significant threat to the environment.
- ♦ The size and/or complexity of the operation poses a significant potential for a discharge to state waters.

SMALL DISCHARGE CONTAINMENT (33 CFR 154.53)

The facility must have fixed catchments, curbing (berming), or other fixed means to contain oil or hazardous material discharge in each hose handling, loading arm, and hose connection manifold areas.

- ♦ The fixed catchments, curbing, or other discharge containment means must have a capacity of at least: two barrels if serving one or more hoses of 6-inch inside diameter or smaller, or loading arms of 6-inch nominal pipe size diameter or smaller; three barrels if serving one or more hoses with an inside diameter of more than 6-inches, but less than 12 inches, or loading arms with a nominal pipe size diameter of more than 6 inches, but less than 12 inches; or four barrels if serving one or more hoses of 12-inch inside diameter or larger, or loading arms of 12 inch nominal pipe size diameter or larger.
- ♦ The facility may use portable means of not less than 1/2 barrel capacity each if the COTP finds fixed means to contain the discharges are not feasible.
- ♦ A mobile facility such as a tank truck or tank car may have a portable means of not less than five-gallon capacity for containment.

EQUIPMENT REQUIREMENTS (Cont.)

NOTES:

DISCHARGE REMOVAL (33 CFR 154.54)

- ♦ Any discharged or loss of oil or hazardous material must be removed quickly from the containment area in a safe and effective manner without any releases to adjacent surface waters.

DISCHARGE CONTAINMENT (33 CFR 154.545)

- ♦ Each facility must have ready access to enough containment material and equipment to clean-up and contain a major spill incident. Equipment generally includes oil booms and absorbent pads.
- ♦ Each facility must establish time limits for deployment of the containment material and equipment considering handling rates, capacity, frequency of facility operations, tidal and current conditions, age and configuration of facility.
- ♦ The COTP may require a facility to surround each vessel conducting an oil or hazardous material transfer with containment material and/or booms.

EMERGENCY SHUTDOWN (33 CFR 154.55)

- ♦ In an emergency (spill, fire, hose disconnect, tank overfill, etc.), the person in charge must be able to stop the flow of oil or hazardous material quickly by shutting down the electrical, pneumatic, or mechanical pumps operating the system.
- ♦ The person in charge can use an electronic voice communications system continuously operated by a person on the facility who can stop the flow in case of an emergency.
- ♦ The shut down point must be located near the dock manifold connection to minimize the loss in case of rupture or failure of the hose, loading arm, or manifold valve.
- ♦ For oil transfers, the person in charge must stop the flow within 60 seconds if the facility first transferred oil on or before November 1, 1980; or within 30 seconds if the facility first transferred oil after November 1, 1980.

**EQUIPMENT
REQUIREMENTS
(Cont.)**

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

- ♦ For hazardous materials, the flow must be stopped within 60 seconds if the facility first transferred hazardous material before October 4, 1990; or within 30 seconds if the facility first transferred on or after October 4, 1990.

COMMUNICATIONS (33 CFR 154.56)

- ♦ Each facility must have a means that enables continuous two-way voice communication between all persons in charge and emergency personnel.
- ♦ Portable radio devices used to comply with above must be intrinsically safe for flammable or combustible liquid transfers.

LIGHTING (33 CFR 154.57)

- ♦ Fixed lighting that adequately illuminates must be used for transfer operations between sunset and sunrise.
- ♦ The illumination must measure at least five (5) foot candles at transfer connection points and one (1) foot candle in transfer operations work areas.
- ♦ Lighting must be located or shielded to prevent misleading or interfering with navigation on the adjacent waterways.

**EQUIPMENT
REQUIREMENTS
(Cont.)**

NOTES:

<i>CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES</i>
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OBJECTIVE

To define a shipyard bulk fluid transfer "Persons In Charge" (PIC) and associated qualifications.

PERSON IN CHARGE

A "Person In Charge" is an individual designated as a person in charge of bulk oil and hazardous materials transfer operations for shipyard facilities that transfer to and from ships and other vessels.

PERSON IN CHARGE REQUIREMENTS

No person may serve or be designated as person in charge unless the following training, experience, and educational requirements are met:

- ♦ Has a minimum 48 hours of experience in shipyard bulk oil and hazardous materials transfer operations to and from ships and other vessels.
- ♦ Possess enough experience and training at the facility for which qualification is desired. The facility operators are to determine that the experience is adequate and the individual can properly operate all associated transfer equipment.

The person in charge must know, understand and have a working knowledge of the following:

- ♦ The hazards associated with each of the materials being transferred
- ♦ The rules and regulations depicted in 33 CFR 156.
- ♦ The procedures described in the operations manual
- ♦ The vessel transfer and vessel transfer control systems.
- ♦ Each facility transfer control system to be used
- ♦ Local spill incident and discharge reporting procedures
- ♦ The contingency plan for discharge reporting and containment

**PERSON IN
CHARGE
QUALIFICATIONS****NOTES:**

<i>CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES</i>
--

PERSON IN CHARGE REQUIREMENTS IDENTIFICATION

Each person in charge must carry evidence of his or her designation as a person in charge. This is generally in the form of an identification badge.

TRANSFER OPERATION RESPONSIBILITIES

- ♦ No PIC can serve on more than one vessel transfer operation at a time, unless authorized by the COTP.
- ♦ No PIC can serve on both the vessel transfer operation and the facility transfer operation, unless authorized by the COTP.

**PERSON IN
CHARGE
QUALIFICATIONS
(Cont.)****NOTES:**

OBJECTIVE

To understand safety requirements associated with transferring oil and other bulk hazardous materials to and from ships and other vessels.

SAFETY REQUIREMENTS

Each operator and facility must ensure that operations are conducted in a safe and effective manner. Safe transfer operations will ensure employee safety as well as environmental protection. A mobile facility may not have direct responsibility. Although, the facility and vessel must ensure the following safety requirements are met:

FACILITY ACCESS

- ♦ The facility must provide for unimpeded access to the facility by local fire fighting personnel, fire trucks, or other emergency personnel should an incident occur.

STORAGE REQUIREMENTS

- ♦ All storage of hazardous materials as specified in 49 CFR 170-179. Storage compartment quantities as needed for the operation or maintenance of the facility.
- ♦ Do not store gasoline or other fuel on a pier, wharf, or other similar structure.

RESPONSE EQUIPMENT

- ♦ Response equipment is adequate to serve as a stop gap measure to minimize spill spread and provide containment and some clean-up until further response is solicited
- ♦ Each piece of personal protective equipment and response equipment is ready to operate in the event of an accident.

**SAFETY
REQUIREMENTS****NOTES:**

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

FIRE HAZARDS

- ♦ A sufficient number of fire extinguishers in the immediate area of the transfer operation on the vessel and near the facility operations.
- ♦ Conspicuously mark the location of each fire hydrant, standpipe, hose station, fire extinguisher, and fire alarm box.
- ♦ Post signs indicating "No Smoking" where smoking is not permitted around the transfer area.
- ♦ Park or operate trucks and other motor vehicles only in designated locations.
- ♦ Ensure all equipment with internal combustion engines do not constitute a fire hazard and are near fire extinguishers.
- ♦ Provide spark arresters on chimneys or appliances that use solid fuel or are located near combustible materials.
- ♦ Unless permitted by the COTP, do not weld or perform hot work.
- ♦ Keep sufficient clearance for heating equipment.
- ♦ There are no open fires or open flame lamps.
- ♦ Maintain electric wiring and equipment in a safe condition to prevent fires.
- ♦ Ensure that electrical wiring and equipment installed after October 4, 1990 meet NFPA 70.
- ♦ Guards are stationed, or equivalent controls acceptable to the COTP are used, to prevent unlawful access, detect fires, and report emergency situations at the facility.

SAFETY REQUIREMENTS (Cont.)

NOTES:

GENERAL REQUIREMENTS

- ♦ Keep all rubbish and extra parts, pieces, and piping organized and in receptacles to increase organization and decrease the likelihood for accidents.
- ♦ Do not refuel automotive equipment with internal combustion engines on piers, wharves, or other similar structures in the shipyard.

SAFETY PROTECTION EQUIPMENT

It is always a good idea to be prepared for the worst, especially when it comes to wearing personal protective equipment (PPE) in the shipyard environment and dealing with hazardous materials. All persons in charge involved in the marine transfer operation are required to wear the following PPE when needed:

- Safety Glasses or Splash Goggles
- Hard Hat
- Gloves
- Life Jackets (on barges and other activities dangerously close to the waters edge)
- Protective Coveralls (disposable)
- Respirators (if required)

SAFETY REQUIREMENTS (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To be aware of records that need to be kept at a shipyard engaged in oil and other bulk hazardous material transferring operations.

RECORDS (33 CFR 154.74)

Each operator of facility must keep records at the facility and make available for examination by the COTP.

REQUIRED RECORDKEEPING

It is a requirement to keep the following records on hand for inspection by the COTP.

- ♦ A copy of the letter of intent.
- ♦ The name of each person currently designated as a person in charge (PIC) of transfer operations.
- ♦ The date and result of the most recent test or examination of all hoses and connections
- ♦ Hose information unless it is marked. (*See Equipment Requirements - Hoses*).
- ♦ The record of all examinations of the facility by the COTP within the last three years.
- ♦ The Declaration of Inspection (*See DOI Requirements*).
- ♦ A record of all repairs made within the last three years involving any component of the facility's vapor control system.
- ♦ A record of all automatic shut downs of the facility's vapor control system within the last three years.
- ♦ Plans, calculations, and specifications of the facility's vapor control system.

RECORDS AND RECORDKEEPING

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

RECORD AVAILABILITY

All records should be readily accessible by the department performing the transfer operation, the environmental department, and the Person in Charge.

**RECORDS AND
RECORDKEEPING**

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To understand the process for reporting and responding to spills and other incidents during bulk oil and hazardous material transfer operations.

GOOD ENVIRONMENTAL PRACTICES

If a spill or leak occurs during the transfer of bulk fluids, some basic steps must be followed by the PIC to ensure proper response, reporting and clean-up. Always remember that employee safety comes first, and that if anyone is in danger, attend to their needs before responding to the spill. The following identify the basic steps in spill response:

1. Stop or slow the flow of the spill
2. Attempt to contain the spill with dikes, berms and/or absorbent materials
3. Report the spill incident to the local incident phone number.

REPORT THE FOLLOWING INFORMATION

- a) Caller's Name and Badge Number;
- b) The extension from which you are calling;
- c) Brief description of the incident (e.g. spill, leak, potential situation);
- d) Location of incident (Building Number, Deck, Frame Compartment, etc.);
- e) Other relevant information.

The caller should stay on the line until advised that notification is complete.

4. Assist responders at the scene to clean up the spill and direct the safety and fire personnel to injured employees.
5. Do not leave the scene of the spill until the spill is cleaned-up and your Designated PIC supervisor has received all of the information and dismissed you.

PROCEDURES FOR SPILLS, LEAKS AND OTHER INCIDENTS

NOTES:

EXTERNAL SPILL REPORTING AND NOTIFICATION

- ♦ The shipyards Designated Responsible Person In Charge shall perform any and all required outside reporting and notification to regulatory agencies.

WATER POLLUTION LAWS AND POTENTIAL FINES

- ♦ The Federal Water Pollution Control Act of 1948 (Clean Water Act), Section 1321(B)(7), requires the person in charge of a vessel or on-shore facility to report a discharge to the appropriate US Agencies (i.e. USCG) as soon as there is knowledge of the discharge.
- ♦ Failure to immediately make notification subjects the Specified Responsible Person In Charge to criminal prosecution with a fine up to \$25,000 per day

WHAT IS A DISCHARGE?

- ♦ A discharge is any release to the environment (adjacent state waters) which causes a sheen to appear on the surface of the water.
- ♦ It takes a very small quantity of oil to cause a sheen! The law states that this amount has been determined to be a potentially harmful quantity.

USCG INSPECTIONS AND SPILL INVESTIGATIONS

- ♦ All USCG inspectors and investigators should be accompanied by a Specified Person In Charge or other responsible company personnel.
- ♦ Escort USCG personnel for their own safety and to assist with investigations or answer questions concerning an inspection.

PROCEDURES FOR SPILLS, LEAKS AND OTHER INCIDENTS (Cont.)

NOTES:

OBJECTIVE

To understand the facility oil spill response plan and its requirements.

RESPONSE PLAN

Each operator of facility must prepare an oil spill response plan to be used in the event of an oil spill. The response plan must be submitted to the COTP.

The response plan must be written in English, divided into the section listed below, and formatted in the order as specified, unless noted otherwise:

1. Introduction and plan contents**2. Emergency response action plan**

- i. Notification procedures
- ii. Spill mitigation procedures
- iii. Response activities
- iv. Sensitive areas
- v. Disposal plan

3. Training and drills

- i. Training procedures
- ii. Drill procedures

4. Plan review and update procedures**5. Appendices**

- i. Facility-specific information
- ii. List of contacts
- iii. Equipment lists and records
- iv. Communications plan
- v. Site-specific safety and health plan
- vi. List of acronyms and definitions
- vii. A geographic-specific appendix for each zone in which a mobile facility operates.

The information in a response plan must be consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR part 300) and the Area Contingency Plan(s).

RESPONSE PLAN**NOTES:**

OBJECTIVE

To understand the Declaration of Inspection and its requirements.

DECLARATION OF INSPECTION (33 CFR 154.74)

- ♦ No person may transfer oil or hazardous material to or from a vessel unless each person in charge (PIC) has filled out and signed the Declaration of Inspection (DOI) form.
- ♦ No PIC may sign the Declaration of Inspection unless he or she has determined by inspection, and indicated by initialing in the appropriate space on the DOI form, that all pre-transfer preparation is satisfactory. See *Transfer of Oil & Hazardous Material in Bulk; Transfer Requirements*.

The Declaration of Inspection must contain at least the following information:

- i. The name or other identification of the transferring vessel or facility and the receiving vessel or facility
- ii. The address of the facility or location of the transfer operation, if not at a facility
- iii. The date the transfer operation is started
- iv. A list of the pre-transfer preparation with spaces on the form for initialing
- v. A space for the date, time of signing, signature, and title of each person in charge during transfer operations on the transferring vessel or facility and the receiving facility or vessel

**DECLARATION
OF
INSPECTION**

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

OTHER REQUIREMENTS

The DOI shall be available for inspection by the COTP during the transfer operation.

A signed copy of the DOI must be kept on board the vessel or at the facility for at least one month from the date of signature.

**DECLARATION
OF
INSPECTION**

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To understand the procedural and preparation requirements for transferring oil or hazardous materials from or to a vessel.

TRANSFER REQUIREMENTS

No person may transfer oil or hazardous material to or from a vessel unless several conditions are met. Persons In Charge must understand these requirements and develop procedures and practices to ensure compliance and minimize the likelihood for spills and other related accidents.

Requirements Covered Include The Following:

- ♦ **VESSEL STABILITY**
- ♦ **HOSE SYSTEM CONTROL**
- ♦ **TANK REQUIREMENTS AND CONTROL**
- ♦ **OTHER EQUIPMENT CONTROL**
- ♦ **PERSON IN CHARGE CONTROL**
- ♦ **EMERGENCY RESPONSE**
- ♦ **LIGHTING AND TIME OF DAY**
- ♦ **SIGNS**

GOOD ENVIRONMENTAL PRACTICES

VESSEL STABILITY

- ♦ The vessel's moorings are strong enough to hold during all expected conditions of surge, current, and weather.
- ♦ Transfer hoses and loading arms are long enough to allow the vessel to move to the limits of its mooring without placing strain on the hose, loading arm, or transfer piping system.

HOSE SYSTEM CONTROL

- ♦ Each hose is supported to prevent kinking or other damage to the hose and strain on its coupling.
- ♦ Each part of the transfer system not necessary for the transfer operation is securely blanked or shut off.

TRANSFER REQUIREMENTS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ The end of each hose and loading arm that is not connected for the transfer is blanked using the proper closure devices.
- ♦ Each overboard discharge or sea suction valve is sealed or lashed in the closed position.
- ♦ The transfer system is attached to a fixed connection on the vessel and the facility. An automatic back pressure shut off nozzle may be used when a vessel is receiving fuel.
- ♦ Each transfer hose has no unrepaired loose covers, kinks, bulges, soft spots, or any other defect.

TRANSFER REQUIREMENTS (Cont.)

NOTES:

TANK REQUIREMENTS AND CONTROL

- ♦ Only use authorized above ground tanks that are clean and integrity tested. Tanks should have some type of secondary containment to control potential spills.
- ♦ Lock-out / Tag-out procedures should be followed on all manifold valves to ensure only authorized use of tanks.
- ♦ Tanks should be outfitted with a manifold system, level alarms, and a tank level indicator.
- ♦ All tanks should be inspected and cleaned before and after each use.

OTHER EQUIPMENT CONTROL

- ♦ All equipment meets the requirements as specified in the 33 CFR part 154. *See Transfer of Oil & Hazardous Material in Bulk: Equipment Requirements.*

PERSON IN CHARGE CONTROL

- ♦ There is a person in charge on the transferring vessel or facility and the receiving vessel or facility.
- ♦ Each person in charge is at the site of the transfer operation and immediately available to the transfer personnel.

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ Each person in charge has in his or her possession a copy of the facility operations manual or vessel transfer procedures.
- ♦ Each person in charge and transfer operations personnel conduct the transfer operation in accordance with the facility operations manual or vessel transfer procedures.
- ♦ The persons in charge at the transferring and receiving vessel or facility must ensure understanding of the following: the identity of the product; the sequence of transfer; the transfer rate; the name or title and location of each person participating in the transfer; details of the transferring and receiving system; critical stages of the transfer; applicable federal, state, and local rules.
- ♦ The person in charge on the transferring vessel or facility and the person in charge on the receiving vessel or facility agree to begin the transfer operation.

EMERGENCY RESPONSE

- ♦ Emergency procedures; discharge containment procedures; discharge reporting procedures; watch or shift arrangement; and transfer shutdown procedures.

LIGHTING AND TIME OF DAY

- ♦ That lighting is provided between sunset and sunrise.

SIGNS

- ♦ A “No Smoking” Sign shall be posted around all transfer operations.
- ♦ A sign that identifies the local on-site spill notification phone extension should be located around the transfer operations area.

TRANSFER REQUIREMENTS (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To understand the procedural and post-transfer requirements for transferring oil or hazardous materials from or to a vessel.

POST-TRANSFER REQUIREMENTS

No person may be considered complete with the transfer of oil or hazardous material to or from a vessel unless several conditions are met. Persons In Charge must understand post-transfer procedures and practices to ensure compliance and minimize the likelihood for spills and other related accidents.

Requirements covered include the following:

- ♦ **AREA CLEAN-UP**
- ♦ **PROPER WASTE ACCUMULATION CONTROL**
- ♦ **LOCK OUT TAG-OUT OF TANKS AND SYSTEMS**
- ♦ **ELECTRICAL POWER CONTROL**

GOOD ENVIRONMENTAL PRACTICES

AREA CLEAN-UP

- ♦ Ensure that the work area is cleaned up. Remove, clean, and properly store all pumps, hoses, and related equipment.
- ♦ Clean up any spilled material inside and outside of containment areas with absorbent materials or other clean-up means.
- ♦ Once area is cleaned up and the transfer process is complete, all associated equipment will be put away and cleaned.
- ♦ A harbor broom should be used and be available if there is a chance for tank leakage or spills.
- ♦ **PROPER WASTE ACCUMULATION CONTROL**
- ♦ All oily waste rags will be properly accumulated in a covered 55 gallon drum that is labeled properly as hazardous waste.

POST-TRANSFER REQUIREMENTS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ All hazardous waste and/or material drums (rags, sludge, oils, solvent, fuel, etc.) must be labeled in accordance with local, state, and federal regulations.
- ♦ A waste transportation form should be filled out and used when the waste is ready to be transported to the main waste accumulation area.

♦ LOCK OUT TAG-OUT OF TANKS AND SYSTEMS

- ♦ Secure all above ground tanks using a lock out tag out system in order to prevent unauthorized access to the tank.
- ♦ Similarly, secure associated systems of piping, pumps, valves, and manifolds to ensure that they are not tampered with, used for the wrong materials, and or not properly cleaned or maintained.
- ♦ Ensure all hoses are drained and capped or linked to prevent discharge during clean-up, storage, and/or transportation.

♦ ELECTRICAL POWER CONTROL

- ♦ Ensure that all electrical power is disconnected and that all compressed air connections are removed before persons in charge complete clean-up and leave the transfer area.

POST-TRANSFER REQUIREMENTS (Cont.)

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

POST TEST

1. The transfer of oil and hazardous material is regulated by which U.S. agency?

- A. U.S. Coast Guard B. U.S. Navy
C. U.S. EPA D. U.S. Department of Commerce

Select the BEST answer to each question.

2. The person who is in charge of a transfer operation for a facility or vessel is called a:

- A. Shipper
B. Transporter
C. Person In Charge
D. Designated Person

NOTES:

3. Before starting each transfer operation, the following document must be completed:

- A. Declaration of Inspection B. Operations Manual
C. Letter of Adequacy D. Letter of Intent

4. Each transfer hose must be marked with the following information:

- A. Designed Burst Pressure and Date of Testing
- B. Date of Manufacture
- C. Date of Purchase
- D. "Oil Service" and Maximum Allowable Working Pressure

5. In an emergency, the person in charge will shut down the pumping operation within:

- A. 45 Seconds B. 15 Seconds
C. 60 Seconds D. 10 Seconds

6. What letter is issued if your shipyard's operations manual meets the requirements of the U.S. Coast Guard regulations?

- A. Letter of Intent
B. Letter of Notice
C. Letter of Authorization
D. Letter of Adequacy

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

7. The primary means of continuous two way voice communication between the persons in charge during a transfer operation will be by:

- | | |
|-------------------|--------------|
| A. Portable Radio | B. Telephone |
| C. Fax | D. Voice |

8. True or False: A person in charge may serve both a transferring vessel or facility and a receiving vessel or facility.

- A) TRUE
- B) FALSE

9. The oil spill response plan must include:

- A. Notification Procedures
- B. Spill Mitigation Procedures
- C. Disposal Procedures
- D. All of the above

10. True or False: A person in charge must have a minimum 48 hours of experience in transfer operations.

- A) TRUE
- B) FALSE

KEY

- | | | | |
|-----|---------|-----|---------|
| 1.A | 2.C | 3.A | 4.D |
| 5.C | 6.D | 7.A | 8.False |
| 9.D | 10.True | | |

POST TEST
(Cont.)

***Select the BEST
answer to each
question.***

NOTES:

ENVIRONMENTAL TRAINING MODULES

MODULE 2

Shipyard Craft Specific Training

DEPARTMENT OF TRANSPORTATION REGULATIONS FOR
HAZARDOUS MATERIALS TRANSPORTATION

**DEPARTMENT OF TRANSPORTATION REGULATIONS
FOR HAZARDOUS MATERIALS TRANSPORTATION
TABLE OF CONTENTS**

INTRODUCTION TO DOT TRAINING (1INTRO.DOC)

OBJECTIVE To introduce the principal subjects covered in this training and the primary learning objectives.

HAZARD CLASSES & DIVISIONS (2HAZ-CLS.DOC)

OBJECTIVE To become familiar with the different hazard classes and divisions of hazardous materials, as specified in 49 CFR for hazardous materials transportation.

HAZARDOUS MATERIALS TRANSPORTATION TABLES (3TABLES.DOC)

OBJECTIVE To become familiar with and be able to utilize the Table of Hazardous Materials as presented in 49 CFR 172.101, and Appendix A, Hazardous Substances, and Appendix B, List of Marine Pollutants.

SHIPPING PAPERS FOR HAZARDOUS MATERIALS (4SHP-PAP.DOC)

OBJECTIVE To properly prepare shipping paper using the information as provided in the hazardous materials table, 49 CFR 172.101.

**GENERAL MARKING REQUIREMENTS FOR HAZARDOUS MATERIALS
TRANSPORTATION (5MARLNG.DOC)**

OBJECTIVE To become familiar with general marking requirements to prepare hazardous materials for transportation.

**LABELING REQUIRED FOR HAZARDOUS MATERIALS TRANSPORTATION
(6LABEL.DOC)**

OBJECTIVE To become familiar with the labeling requirements and to choose a proper label(s) to prepare for hazardous material transport.

PERFORMANCE HAZARDOUS MATERIALS PACKAGING (7PACKAGE.DOC)

OBJECTIVE To understand DOT performance packaging standards for proper shipment of hazardous materials.

PLACARDING FOR HAZARDOUS MATERIALS TRANSPORTATION

(8PLACKARD.DOC)

OBJECTIVE To learn the importance and general requirements of placarding for proper transportation of hazardous materials.

LOADING AND UNLOADING OF HAZARDOUS MATERIALS (9LOADING.DOC)

OBJECTIVE To understand proper loading and unloading procedures and practices for hazardous materials while moving to and from motor vehicles.

EMERGENCY RESPONSE FOR HAZARDOUS MATERIALS TRANSPORTATION

(10EMERGY.DOC)

OBJECTIVE To understand the emergency response requirements mandated by the DOT in 49 CFR for transportation of hazardous materials.

INCIDENT REPORTING FOR HAZARDOUS MATERIALS TRANSPORTATION

(11REPORT.DOC)

OBJECTIVE To become aware of proper reporting procedures to follow in the event of an incident involving hazardous materials.

POST TEST (12TEST.DOC)

INTRODUCTION

The transportation of hazardous materials is regulated by the U.S. Department of Transportation (DOT) under the authority of the Hazardous Materials Transportation Act. The regulations have been created to ensure safe transportation of hazardous materials by shippers and carriers. These regulations are outlined in the 49 Code of Federal Regulations (CFR) parts 171 through 180.

This training provides a basic overview of DOT regulations for hazardous materials shippers and carriers in the shipyard environment. Those individuals who are involved with these issues on a daily basis should frequently consult the regulation as specified in the 49 CFR before preparing for shipment to ensure compliance. The shipyard environmental department is also a good source of information when questions of law and procedure are encountered.

The principal subjects covered in this training are as follows:

- ♦ DOT hazard class identification and divisions
- ♦ Use of DOT table of hazardous materials and shipping papers
- ♦ Proper shipping papers, marking, and labeling for hazardous materials
- ♦ Selection of proper material performance packaging
- ♦ Selection and placement of placards
- ♦ Proper loading and unloading of hazardous materials
- ♦ Emergency response and incident reporting

INTRODUCTION TO DOT TRAINING

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

TRAINING OBJECTIVES

After completing this training module, shipyard employees will be aware of several aspects of hazardous materials transportation and will be able perform the following:

- A)** Prepare hazardous materials for highway transport in accordance with U.S. DOT regulation as contained in 49 CFR
- B)** Utilize the Table of Hazardous Materials for shipping paper completion
- C)** Package, mark, label, placard hazardous materials in accordance with DOT regulations
- D)** Load and unload hazardous materials in accordance with DOT regulations

**INTRODUCTION
TO DOT TRAINING
(Cont.)**

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To become familiar with the different hazard classes and divisions of hazardous materials, as specified in 49 CFR for hazardous materials transportation.

HAZARD CLASSES

The “hazard class” of any particular hazardous material is indicated either by its class (or division) **number**, its **class name**, or by the letters "**ORM-D**". The hazard class or division is required on the shipping paper and it is also used to determine Placarding, Marking and other Labeling requirements.

HAZARD CLASSES & DIVISIONS

NOTES:

CLASS/DIVISION CLASS/DIVISION NAME

- 1.1 Explosives (mass explosion hazard)
- 1.2 Explosives (projection hazard)
- 1.3 Explosives (predominantly a fire hazard)
- 1.4 Explosives (no significant blast hazard)
- 1.5 Very Insensitive Explosives; Blasting Agents
- 2.1 Flammable Gas
- 2.2 Non-Flammable Compressed Gas
- 2.3 Poisonous Gas
- 3.0 Flammable & Combustible Liquid
- 4.1 Flammable Solid
- 4.2 Spontaneously Combustible Material
- 4.3 Dangerous When Wet Material
- 5.1 Oxidizer
- 5.2 Organic Peroxide
- 6.1 Poisonous Materials
- 6.2 Infectious Substance (Etiologic Agent)
- 7.0 Radioactive Material
- 8.0 Corrosive Material
- 9.0 Miscellaneous Hazardous Materials
- ORM-D Consumer Commodity and Small Arms
Ammunition

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

OBJECTIVE

To become familiar with and be able to utilize the Table of Hazardous Materials as presented in 49 CFR 172.101, and Appendix A, Hazardous Substances, and Appendix B, List of Marine Pollutants.

HAZARDOUS MATERIALS TABLE

When shipping hazardous materials, communication is critical. Under 49 CFR, information is communicated through shipping papers, labels, markings, and placards. And the principle communication tool in preparing for hazardous materials shipment is the Hazardous Materials Table found in 49 CFR 172.101.

From the Hazardous Materials Table (HMT), you will find the following information:

INFORMATION	HMT COLUMN
Proper shipping name	2
Hazard class or division	3
Identification number	4
Packing group (PG)	5
Symbol	1
Label(s)	6
Packaging authorization & special provisions	7 & 8
Air package limits	9
Water requirement	10

SCAN A PORTION OF 172.101

**HAZARDOUS
MATERIALS
TRANSPORTATION
TABLES**

NOTES:

(1) SYMBOLS

- "A" Regulated only when shipped by air
"W" Regulated only when shipped by water
"+" Fixes the name, hazard class, division, and packing group without regard to hazard definitions
"D" Optional domestic names that are not generally recognized internationally

"I" International Names that are optional for domestic shipment

(2) PROPER SHIPPING NAME

Required on packages and shipping papers. Roman print only, italics and punctuation are supplementary and not part of the proper shipping name. See 49 CFR 172.203 for additional descriptions.

(3) HAZARD CLASS & DIVISION

Determines placarding. See 49 CFR 172.504. Required on shipping papers.

(4) ID NUMBERS

Required on shipping papers, packages, orange panels (tanks), and placards (tanks). See 49 172.302 for additional information.

(5) PACKING GROUP

Measures "degree of hazard". Determines packaging for each hazard class and division.

- I Great danger
- II Medium danger
- III Minor danger

(6) LABELING

Minimum labeling requirements. See 49 CFR 172.402 for additional labels.

HAZARDOUS MATERIALS TRANSPORTATION TABLES (Cont.)

NOTES:

(7) SPECIAL PROVISIONS

Includes packaging limitations, restrictions, and added requirements.
See 49 CFR 172.102.

"A" prefix air shipments only
"B" prefix bulk packages only
"H" prefix highway shipment only
"N" prefix non-bulk packages only
"R" prefix rail shipment only
"T" prefix intermodal tanks only
"W" prefix water shipments only

Number only codes apply to all packages

(8A) EXCEPTIONS

For limited quantity packages

(8B-8C) BULK PACKAGING

>450 liters for liquids
<400 kg for solids
>454 kg water capacity for gases

(9) QUANTITY LIMITS

The largest amount allowed in one package. Forbidden means not to be shipped in any amount.

(10) STOWAGE ON VESSEL

See 49 CFR 172.101(k), 176.63, and 176.84

**HAZARDOUS
MATERIALS
TRANSPORTATION
TABLES
(Cont.)**

NOTES:

HAZARDOUS SUBSTANCES

Appendix A of the hazardous materials table, 49 CFR 172.101, contains the names of hazardous materials and their corresponding reportable quantities (RQ's), which are listed as "hazardous substances." The Appendix A is divided into two tables: "Hazardous Substances Other Than Radionuclides" (non-radioactive) and "Radionuclides" (radioactive). A material listed in this appendix is regulated not only as a hazardous material but also as a hazardous substance if it is a reportable quantity.

SCAN HAZ SUBSTANCE TABLE

MARINE POLLUTANTS

Appendix B contains the names of marine pollutants. The letters "PP" appear in the column entitled "S.M.P." indicate severe marine pollutants.

SCAN MARINE POLLUTANTS

HAZARDOUS MATERIALS TRANSPORTATION TABLES (Cont.)

NOTES:

OBJECTIVE

To properly prepare shipping paper using the information as provided in the hazardous materials table, 49 CFR 172.101.

SHIPPING PAPERS

The Department of Transportation (DOT) requires shippers provide "shipping papers" with every hazardous material shipment. The shipping papers communicate information regarding contents, quantities, and hazards of the materials being shipped. Therefore, the shipping papers provide the important information to emergency responders in the event of an accident.

GENERAL REQUIREMENTS FOR SHIPPING PAPERS

1. Must be legible, printed, and in English.
2. Do not use codes or abbreviations, unless explicitly authorized.
3. If hazardous materials and other materials are listed on the same shipping paper, clearly distinguish the hazardous materials by:
 - A) Listing the hazardous materials first;
 - B) Listing the hazardous materials in a contrasting color;
 - or
 - C) Indicating the hazardous material by placing an "X" before the proper shipping name in a column captioned "HM."
4. The shipping description of each hazardous material must include:
 - ♦ The Proper Shipping Name
 - ♦ The Numerical Hazard Class
 - ♦ The UN or NA number
 - ♦ The Packing Group number in Roman numerals, preceded by the letters "PG"
 - ♦ The total quantity of material being shipped
5. Include emergency response telephone number.

SHIPPING PAPERS FOR HAZARDOUS MATERIALS

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

6. Must include the certification statement attesting to the accuracy of the paperwork, the proper classification and naming of the material, the correctness and safety of the packaging, and the proper marking and labeling of the packages.

BILL OF LADING

ACME SHIPBUILDING & REPAIR

123 Dry-dock Street

Any Harbor, USA 12345 **In Case of Emergency, Call (123)555-1234**

TO: ABC Chemical Supply
 987 Chlorine Way
 Commercial, USA 12345

NO OF UNITS	H M	DESCRIPTION OF ARTICLE	TOTAL QTY	RATE CHARGE S
2 Drums	X	Acetone, 3, UN 1090, PG II	725 lb	
10 Unit	X	Batteries, wet, filled with acid, 8, UN 2794, PG III	50 lb	
1 Cyl.	X	Carbon dioxide, refrigerated liquid, 2.2, UN 2187	50 lb	
10 Cans	X	Paint, 3, UN 1263, PG II	500 lb	
3 Drum	X	Paint related material, 3, UN 1263, PG II	1500 lb	
1 Bottle	RQ	Mercury, 8, UN 2809, PG III, Marine Pollutant	10 lb	

Shipper's Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Shipper's Signature _____

Placards to be offered:

Flammable Liquid

**SHIPPING PAPERS FOR
HAZARDOUS MATERIALS**
(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

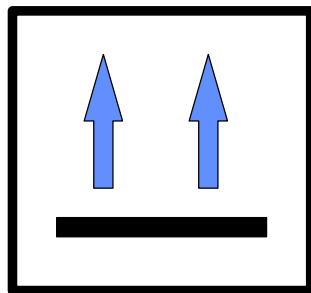
OBJECTIVE

To become familiar with general marking requirements to prepare hazardous materials for transportation.

MARKING

Marking refers to the information applied on packages containing hazardous materials. Shipyard must follow specific marking requirements to ensure compliance. The general marking requirements are as followed:

- ♦ All containers of hazardous materials must, unless specifically excepted, be marked with the proper shipping name, ID number, and the name and address of shipper or consignee. If a generic "n.o.s." name is used, mark the technical name of the constituent(s) causing the hazard.
- ♦ The marking must be in English, and printed on or affixed to the surface of a package or on a label, tag, or sign.
- ♦ The marking must be in a sharply contrasting color to its background.
- ♦ The marking must not be obscured by other labels, and away from any other marking.
- ♦ Packages with an inner packaging for liquids require marking with "This End Up" arrows.



- ♦ A previously marked package does not require remarking if the marking is legible.

GENERAL MARKING REQUIREMENTS FOR HAZARDOUS MATERIALS TRANSPORTATION

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

OBJECTIVE

To become familiar with the labeling requirements and to choose a proper label(s) to prepare for hazardous material transport.

LABELING

Labels communicate the hazards of the material contained in the package. The label needed for each hazardous material is specified in the column six of the Hazardous Materials Table and the following table:

HAZARD CLASS OR DIVISION	LABEL NAME
1.1	EXPLOSIVE 1.1
1.2	EXPLOSIVE 1.2
1.3	EXPLOSIVE 1.3
1.4	EXPLOSIVE 1.4
1.5	EXPLOSIVE 1.5
1.6	EXPLOSIVE 1.6
2.1	2.1 FLAMMABLE GAS
2.2	2.2 NON-FLAMMABLE GAS
2.3	2.3 POISON GAS
3.0	3.0 FLAMMABLE LIQUID ()
Combustible liquid	(none)
4.1	FLAMMABLE SOLID
4.2	SPONTANEOUSLY COMBUSTIBLE
4.3	DANGEROUS WHEN WET
5.1	OXIDIZER
5.2	ORGANIC PEROXIDE
6.1	(Packing Groups I & II) POISON
6.1	(Packing Group III) KEEP AWAY FROM FOOD
6.2	INFECTIOUS SUBSTANCE
7.0	RADIOACTIVE WHITE -I
7.0	RADIOACTIVE YELLOW -II
7.0	RADIOACTIVE YELLOW - III
7.0(empty packages)	EMPTY
8.0	CORROSIVE
9.0	CLASS 9

**LABELING REQUIRED
FOR HAZARDOUS
MATERIALS
TRANSPORTATION**

NOTES:

DOT HAZARD CLASS LABELS

scan DOT labels here

**LABELING REQUIRED
FOR HAZARDOUS
MATERIALS
TRANSPORTATION**

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To understand DOT performance packaging standards for proper shipment of hazardous materials.

The DOT defines proper performance packaging to ensure that hazardous materials are contained in such a way to minimize the likelihood for spills that can injure people and/or the environment.

PERFORMANCE PACKAGING

- ♦ DOT provides various packaging alternatives for each hazardous material ranging from ample-sized "limited quantity" packages to tank trucks or rail cars.
- ♦ Each package has explicit design and performance standards it must meet.
- ♦ The packaging for most hazardous materials is classified into three groups:

Group I - Great danger

Group II - Medium danger

Group III - Minor danger

- ♦ Each class of material needs to be packaged accordingly. The Hazardous Materials Table identifies what kind of packaging is needed.
- ♦ General performance specifications for packaging are found in 49 CFR Part 173.
- ♦ Every package designed to transport hazardous materials must be marked by the manufacturer to indicate compliance with DOT performance packaging standards.

PERFORMANCE HAZARDOUS MATERIALS PACKAGING

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

PERFORMANCE PACKAGING MARKINGS

First Number	Description	Following Letter	Description Last Number
1	Drum	A	Steel Indicates package subcategory and varies by package type
2	Wooden Barrel	B	Aluminum
3	Jerrican	C	Natural Wood
4	Box	D	Plywood
5	Bag	F	Reconstituted Wood
6	Composite Packaging	G	Fiberboard
7	Pressure Receptacle	H	Plastic
		L	Textile
		M	Multi-wall Paper
		N	Metal other than steel or aluminum
		P	Glass, Porcelain, or Stoneware

**PERFORMANCE
HAZARDOUS
MATERIALS
PACKAGING
(Cont.)**

NOTES:

PERFORMANCE PACKAGING EXAMPLE

4G: - Box constructed of fiberboard

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To learn the importance and general requirements of placarding for proper transportation of hazardous materials.

PLACARDS USED FOR SHIPPING HAZARDOUS MATERIALS

- ♦ Placards are diamond shaped warning notices that alert emergency response personnel to the potential dangers associated with the hazardous materials carried in trucks, freight containers, cargo tanks, portable tanks, rail car, and ships.
- ♦ Shippers must provide the placards; the carrier cannot transport the hazardous materials without the proper placards.
- ♦ Tables 1 and 2 in 49 CFR 172.504 list which placards are required for each class. Any quantity of materials listed in Table 1 requires a specific placard; Table 2 materials require placards only if their weight exceeds 1,000 pounds.
- ♦ Placards must be easily visible on all four sides of the vehicle, tank, or container.

TABLE 1 "ANY QUANTITY"

CATEGORY OF MATERIAL	PLACARD NAME
1.1	EXPLOSIVES 1.1
1.2	EXPLOSIVES 1.2
1.3	EXPLOSIVES 1.3
2.3	POISON GAS
4.3	DANGEROUS WHEN WET
6.1(PG I, inhalation hazard only)	POISON
7.0 (Radioactive Yellow III label only)	RADIOACTIVE

PLACARDING FOR HAZARDOUS MATERIALS TRANSPORTATION

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

TABLE 2 "1,000 LBS"

CATEGORY OF MATERIAL	PLACARD NAME
1.4	EXPLOSIVE 1.4
1.5	EXPLOSIVE 1.5
1.6	EXPLOSIVE 1.6
2.1	FLAMMABLE GAS
2.2	NON-FLAMMABLE GAS
3.0	FLAMMABLE
Combustible Liquid	COMBUSTIBLE
4.1	FLAMMABLE SOLID
4.2	SPONTANEOUSLY COMBUSTIBLE
5.1	OXIDIZER
5.2	ORGANIC PEROXIDE
6.1 (PG I or II, other than PG I inhalation hazard)	POISON
6.1 (PG III)	KEEP AWAY FROM FOOD
6.2	(none)
8.0	CORROSIVE
9	CLASS 9
ORM-D	(none)

**PLACARDING FOR
HAZARDOUS
MATERIALS
TRANSPORTATION
(Cont.)**

NOTES:

Scan DOT hazard class placards here

OBJECTIVE

To understand proper loading and unloading procedures and practices for hazardous materials while moving to and from motor vehicles.

GENERAL REQUIREMENTS FOR LOADING AND UNLOADING HAZARDOUS MATERIALS

During loading and unloading of hazardous materials, ensure the following items are adhered to:

- ♦ Turn off all vehicle engines to prevent motion of the vehicle during the loading process.
- ♦ Always ensure that the handbrake is fully set and vehicle in gear or park before loading or unloading commences.
- ♦ Secure packages within the vehicle with straps and ropes to minimize movement within the vehicle and minimize the potential for accidents.
- ♦ Do not allow hazardous materials into or on any pole trailer.
- ♦ Never smoke cigarettes or cigars while loading or unloading hazardous materials.
- ♦ Always keep fire away from the loading area, especially when moving flammable and combustible materials.
- ♦ Do not use tools such as jacks or pry bars that could damage the container while loading and unloading.
- ♦ Do not tamper with containers or contents during transit. Never open containers during transport or in the loading area. All container opening should occur in a designated storage area.
- ♦ Require that a qualified person be present at all times during loading or unloading operations.

LOADING AND UNLOADING OF HAZARDOUS MATERIALS

NOTES:

OBJECTIVE

To understand the emergency response requirements mandated by the DOT in 49 CFR for transportation of hazardous materials.

EMERGENCY RESPONSE INFORMATION

Emergency response requirements involve information that can be used in the mitigation and response to an incident involving hazardous materials.

The emergency response information for each material must be presented 1) on a shipping paper; or 2) in a document (e.g., a material safety data sheet or an emergency response guidance document) accompanying the shipping paper.

The emergency response information must contain the following:

- ♦ The basic description and technical name of the hazardous material
- ♦ All immediate hazards to health
- ♦ Risks of fire or explosion
- ♦ Immediate precautions that must be taken in case of an accident or environmental incident
- ♦ Immediate methods for handling raw materials
- ♦ Initial methods for handling spills or leaks in the absence of fire department responders
- ♦ Preliminary first aid measures

EMERGENCY RESPONSE TELEPHONE #

In addition, an emergency response telephone number must be provided on the shipping paper. This telephone number must be manned at all times during transportation of the shipment. The person who answers the telephone must be knowledgeable in the hazards of the materials being shipped and can give additional information to emergency responders.

**EMERGENCY
RESPONSE FOR
HAZARDOUS
MATERIALS
TRANSPORTATION****NOTES:**

OBJECTIVE

To become aware of proper reporting procedures to follow in an event of incident involving hazardous materials.

REPORTING OF INCIDENTS

When to Report?

- ♦ At the earliest practicable moment.
- ♦ A person is killed.
- ♦ A person is hospitalized.
- ♦ Property damage exceeds \$50,000.
- ♦ An evacuation of the general public occurs lasting one hour or more.
- ♦ Major transportation arteries or facilities are closed.
- ♦ Aircraft flight pattern or routine is altered.
- ♦ Fire, breakage, or spill involving radioactive material or etiologic agents occurs.
- ♦ There has been a release of a marine pollutant in a quantity exceeding 450 L for liquids or 400 kg for solids.
- ♦ A continuing danger to life exists.
- ♦ Judgment of the driver warrants.

What to Report?

Immediately report the following to DOT at (800) 424-8802:

- ♦ Name of the reporter.
- ♦ Name and address of a carrier -shipyard's name and address if act as own carrier.
- ♦ Phone number of the reporter.
- ♦ Date, time, and location of incident.
- ♦ The extent of injuries, if any.
- ♦ Classification, name, and quantity of hazardous materials.
- ♦ Type of incident and nature of hazards.

Written Report

- ♦ Submit to DOT, in duplicate, on DOT Form F5800.1 (Rev. 6/89) within 30 days of an incident.

INCIDENT REPORTING FOR HAZARDOUS MATERIALS TRANSPORTATION

NOTES:

**CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES**

1. Transportation of hazardous materials in the U.S. is regulated by:

- A. American Trucking Association
- B. Each state individually
- C. The U.S. Environmental Protection Agency
- D. The U.S. Department of Transportation under uniform national rules

2. True or False: Transportation of hazardous materials by a private individual for personal use is NOT regulated under US DOT rules.

3. A person who prepares and offers hazardous materials for transportation is a:

- | | |
|----------------|--------------|
| A. Shipper | B. Carrier |
| C. Transporter | D. Consignee |

4. The proper shipping name to use on the shipping paper is:

- A. The name given by the manufacturer of the material
- B. The most descriptive name you can think of
- C. The best proper shipping name from the Hazardous Materials List
- D. A generally recognized trade name

5. A shipping paper must contain an emergency telephone number. True or False

6. A diamond-shaped label on a hazardous material package shows:

- A. The US DOT hazard posed by the material
- B. The name of the shipper
- C. The name of the carrier
- D. The quantity of material shipped

7. Shipping papers must accompany:

- | | |
|---|---|
| A | B |
| C | D |

8. True or False: The initials "PG" in a DOT description stand for "Packing Group."

POST TEST

Select the BEST answer to each question.

NOTES:

9. The US DOT placards are:

- A. Information sheets containing basic data about a particular hazardous material
- B. Warning notices posted on 55-gallon drums
- C. Warning notices placed on trucks to accompany shipment of hazardous materials
- D. Warning notices affixed to small packages

10. When packaging hazardous material for shipment, you must use:

- A. The packaging the manufacturer provided.
- B. Any DOT specification packaging
- C. Any package in good condition
- D. The DOT specification packaging approved for that material

KEY 1. D 2.TRUE 3.A 4.C 5.TRUE
 6.A 7.D 8.TRUE 9.C
 10. D

ENVIRONMENTAL TRAINING MODULES

MODULE 2

Shipyard Craft Specific Training

PAINT

**PAINT
TABLE OF CONTENTS**

(1-1 - 1-2) PAINT MATERIALS CONTROL AND RECORDKEEPING LIFE-CYCLE (1-MATRI.DOC)

OBJECTIVE To enhance shipyard environmental management and improve compliance through accurate paint materials control and proper recordkeeping.

(2-1 - 2-2) PAINT AREA ORGANIZATION AND HOUSEKEEPING (2-ORGANZ.DOC)

OBJECTIVE Maintain a clean and organized paint area to minimize the likelihood for accidental spills and potential pollution problems.

(3-1 - 3-2) PAINT EQUIPMENT MAINTENANCE AND CLEAN-UP (3-CLEAN.DOC)

OBJECTIVE To clean and maintain paint equipment in such a manner that ensures proper operation and environmental protection.

(4-1 -4-4) SECONDARY CONTAINMENT AREAS AND MAINTENANCE (4-CONTAL.DOC)

OBJECTIVE Utilize secondary containment whenever possible and maintain the containment area.

(5-1) PAINT STORAGE AND MIXING AREA MANAGEMENT (5-STORX.DOC)

OBJECTIVE To provide proper storage facilities and mixing areas for paint material usage and waste accumulation.

(6-1 - 6-5) WASTE STORAGE AND ACCUMULATION REQUIREMENTS (6-WSTORE.DOC)

OBJECTIVE To store and accumulate wastes in an organized manner in compliance with all federal, state, and local requirements.

(7-1 - 7-3) PAINT WASTE MINIMIZATION AND RECYCLING (7-WSTMIN.DOC)

OBJECTIVE To promote waste minimization, recycling, reuse and proper reclamation techniques in the paint department.

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

(8-1 - 8-3) MINIMIZE OVERSPRAY AND INCREASE TRANSFER EFFICIENCY (8-OVERSP.DOC)

OBJECTIVE To minimize the amount of paint overspray and increase overall transfer efficiencies while painting throughout the shipyard.

(9-1 - 9-2) OUTDOOR PAINT OVERSPRAY CONTAINMENT (9-TARPS.DOC)

OBJECTIVE To reduce particulate matter emissions from painting operations in shipyards through implementation containment shrouding and wind screens.

(10-1 - 10-2) BOOTHS, CABINETS AND INDOOR TANK/COMPARTMENT PAINTING (10-BOOTH.DOC)

OBJECTIVE To minimize particulate matter and VOC emissions from painting operations in booths, tanks and enclosed compartments through implementation of preventive maintenance and improved environmental practices.

(11-1 - 11-3) SOLVENT WIPING SURFACE PREPARATION (11-WIPE.DOC)

OBJECTIVE To reduce volatile emissions from solvent wiping operations through process modification, material substitution, work practice changes, and equipment modification.

(12-1 - 12-2) PAINT CRAFT AREA INSPECTION (12-INSPE.DOC)

OBJECTIVE Inspect and evaluate paint area compliance with all good environmental practices.

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To enhance shipyard environmental management and improve compliance through accurate paint materials control and proper recordkeeping.

RECORDKEEPING AND COMPLIANCE

Many processes, maintenance operations, and self inspections should be documented through the use of recordkeeping. Recordkeeping is a very important issue with respect to many local, state and federal environmental rules and regulations. Process and operational records are used for determining and maintaining compliance with permit conditions and are a key element in establishing a paint material/waste recordkeeping program.

PAINT USAGE AND DISPOSAL ACCOUNTABILITY

Paint materials and waste tracking and recordkeeping provide for accountability relationships through material usage, waste generation, and other process documentation. Accurate paint materials and waste recordkeeping is essential when collecting and reporting usage and emission release information for various federal and state environmental reporting purposes. Similarly, records of material usage and disposal are necessary to measure the effectiveness of waste minimization efforts in the shipyard.

RESPONSIBILITIES

Recordkeeping responsibilities and procedures are generally decentralized throughout the shipyard. In many cases, recordkeeping information is forwarded to the shipyard's environmental department for material tracking, analysis, regulatory reporting, and archiving. A variety of methods exist for maintaining records and tracking paint material usage and disposal. Depending on the complexity and quantity of information being recorded, computer databases or hand written information combined with customized forms is effective. Database systems are excellent for recordkeeping and material tracking, and offer retrieval and data-manipulation capabilities for reporting. The important factor is that the recorded information is complete, accurate, accounts for process materials and waste, and information is readily accessible.

PAINT MATERIAL CONTROL AND RECORDKEEPING LIFE-CYCLE

NOTES:

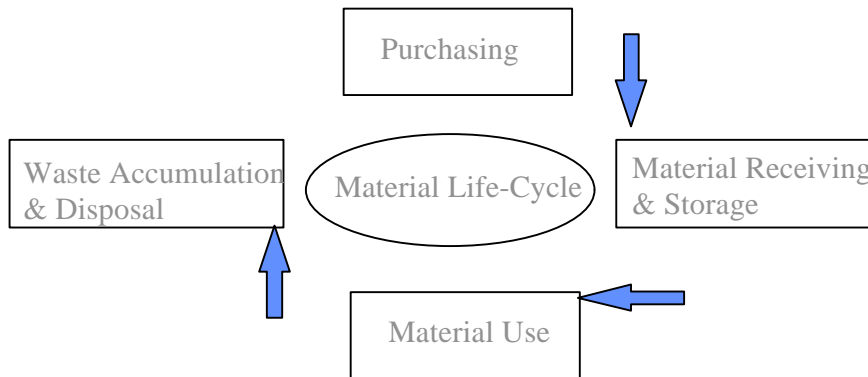
CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

Accurate recordkeeping of paint material usage, paint waste disposal, and waste accumulation area inspection is an integral part of complying with various federal and state environmental requirements. The following four areas need particular attention when it comes to paint material and waste tracking and recordkeeping life-cycle:

- ♦ **Purchase Records**
- ♦ **Paint Issue Record from Paint Storage**
- ♦ **Actual Paint Usage Records**
- ♦ **Waste Disposal Records**

Materials Tracking and Recordkeeping Life-Cycle

Maintain accurate and consistent records of paint material purchase records, issues and usage data, and waste generation records.



GOOD ENVIRONMENTAL PRACTICES

MATERIAL PRESCREENING

- ♦ Perform a prescreen review of all paint, and paint associated Material Safety Data Sheets (MSDSs) prior to material purchase and delivery to the shipyard. Screening procedures should be established for environmental and safety review of the paint prior to purchase. In many cases, paints must meet specific requirement of environmental permits. Establishing an “approved” paint products list is desirable.

INVENTORY CONTROL AND RECORDKEEPING

- ♦ Develop inventory control practices that minimize the amount of paint materials on-site at one time.

PAINT MATERIAL CONTROL AND RECORDKEEPING LIFE-CYCLE (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ Whenever possible, have the paint vendor deliver the material Just-in-Time for use. This will keep inventories low and reduce the chance of spills and other related accidents.
- ♦ Develop a system of procedures, forms, and computer recordkeeping to account for paint material mass balance relationships. For example, track site or job specific paint usage and correlate this with the specific waste generation.
- ♦ Maintain a current inventory file of air quality equipment and coating process air permits. Always review the permits to determine what records are required to keep. It is always a good idea to be proactive with recordkeeping requirements.
- ♦ Maintain accurate and consistent records of self inspections, regulatory inspections, maintenance functions, and material usage/disposal.

RECORDKEEPING EVALUATION

- ♦ Frequently provide for self-evaluation of recordkeeping and paint materials tracking. Encourage self-inspections to ensure that responsible individuals are maintaining complete and accurate records.
- ♦ Educate individuals involved with processes that accurate record-keeping is critical for waste minimization, process control, and regulatory compliance.

PAINT MATERIAL CONTROL AND RECORDKEEPING LIFE-CYCLE

(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

Maintain a clean and organized paint area to minimize the likelihood of accidental spills and potential pollution problems.

KEEP YOUR WORK AREA CLEAN AND ORGANIZED

Keeping your work area clean and organized creates efficiency, by allowing you to perform your duties without immediate distractions and potential accidents. It further provides a clean work area for subsequent shift workers to complete their tasks without housekeeping and spill accident problems. Ultimately it makes your job easier. Hazardous material and waste spills cost time, money and potentially large legal liabilities to the shipyard.

Always keep the immediate area where you perform your work free of trash, debris, and other materials that can get in the way and cause spills. This is important because organization maintains your work area (shipyard, office, warehouse, etc.) in a clean, professional, and safe manner. This approach to area management promotes an efficient working environment and it minimizes or prevents paint or solvent spills.

GOOD ENVIRONMENTAL PRACTICES

ORGANIZE YOUR PAINT AREA

- ♦ An organized work area will have specific places and areas for specific operations and storage. This will increase area efficiency and minimize the likelihood for spills. Have specific areas free of clutter and include enough area for the following:

PAINT MATERIAL STORAGE

- ♦ Paint materials should have an organized storage area that makes it easy to find materials, easy to keep records, and uncluttered to minimize potential for spills.
- ♦ All paint materials and waste should be labeled properly for increased organization and safety.

PAINT AREA ORGANIZATION AND HOUSEKEEPING

NOTES:

PAINT MIXING, TRANSFER, AND CLEAN-UP AREAS

- ♦ Keep work areas where paint mixing, transfer, and equipment clean-up occurs, contained and organized. Ensure that you have a roomy and organized work area so that materials are not knocked over during operations.

MAINTAIN CLEAN PAINTING AREAS

- ♦ Ensure the area that you will be painting is free of paint cans and other obstacles that can result in accidental spills. An organized approach to painting will increase efficiency. All paint material and paint overspray should be swept up and properly disposed as soon as practical. Wind and rain can transport overspray and other uncontrolled paint into water or soil.

WASTE ACCUMULATION

- ♦ Ensure that the paint waste accumulation area is organized and cleaned-up on a daily basis. Waste should be segregated into separate containers with proper accumulation labels including: Waste Solvents, Rags, Cloths, Rollers, Paint (Solid), Paint (Liquid), Empty Container, and Waste Containment Shrouding.

**PAINT AREA
ORGANIZATION
AND
HOUSEKEEPING
(Cont.)**

NOTES:

OBJECTIVE

To clean and maintain paint equipment in such a manner that ensures proper operation and environmental protection.

PAINT EQUIPMENT CLEANING AND MAINTENANCE

At the end of each shift, painters clean their equipment. This equipment can include paint guns, paint lines, mixing pots, pressure pumps and an assortment of brushes, rollers, and support equipment. Equipment is generally cleaned using new or recycled solvents. The solvent acts to breakdown the paint materials and clean the equipment until it is free of excess paint.

This cleaning process is very important for maintaining paint equipment. If the equipment is not cleaned properly, it will become clogged with dried paint, which results in leaks, poor spray patterns, and decreased transfer efficiency. Poorly operating equipment also results in excessive paint waste and production delays. Cleaning and equipment maintenance go hand in hand. Maintenance is the function of replacing parts, seals and other essential elements of the painting equipment. Equipment cleaning involves the day-to-day cleaning process.

GOOD ENVIRONMENTAL PRACTICES

SPRAY GUN CLEANING

- ♦ Direct spray gun cleaning solvent into a covered pail or drum using minimal pressure.
- ♦ Never spray solvents into the air when cleaning guns and lines.
- ♦ Soak spray guns in closed containers for added cleaning.
- ♦ Investigate using circulating paint gun solvent cleaning units and use them if they are feasible.

EQUIPMENT MAINTENANCE

- ♦ Maintain paint guns and pots to minimize the potential for leaks and improper spraying.

PAINT EQUIPMENT MAINTENANCE AND CLEAN-UP

NOTES

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ All paint spaying equipment should be on a preventive maintenance program to minimize leaks and improper functioning. This will provide for efficient painting practices as well as help protect the environment by reducing the potential for air and water pollution.
- ♦ Replace the gun immediately if there are signs of leakage or severe spattering. Extra spray guns should be available for immediate replacement. This will reduce production delays.

CLEAN-UP MATERIAL EVALUATION

- ♦ Minimize the use of VOC containing materials for clean-up operations.
- ♦ Investigate recycling solvents for use as clean-up and surface preparation solvent.

PAINT EQUIPMENT MAINTENANCE AND CLEAN-UP (Cont.)

NOTES:

OBJECTIVE

Utilize secondary containment whenever possible and maintain the containment area.

SECONDARY CONTAINMENT DEFINED

Secondary containments are structures set-up around and under containers to capture leaks, drips and other spills from stored containers and material transfer operations. They are very effective at preventing the spread of paint spills and leaks. They provide an area that is much easier for cleaning up spills. Drip pans, bermed areas and containment pallets are examples of secondary containment devices.

Secondary containment should be used when transporting, storing, mixing, transferring and using paint materials and wastes. It is critical that secondary containment be used when there is a high probability that an accidental spill would reach adjacent waters. Be aware of storm drains, drainage channels, piers, freeports and other pathways to nearby waters and always use secondary containment when working around them. Similarly, paint storage and accumulation drums frequently must be surrounded by a curb, dike, berm or some other type of secondary containment system which provides sufficient area to help contain and control spills.

GOOD ENVIRONMENTAL PRACTICES

SECONDARY CONTAINMENT REQUIREMENTS

- ♦ In many cases, paint operations should be conducted in a secondary containment area. The containment system should be large enough to store materials and allow for enough work area to minimize the likelihood for spills. In general, the containment area should hold enough volume to contain 110% of the volume of the largest container in the area.

SECONDARY CONTAINMENT DESIGN

- ♦ The containment systems must be designed to be free of cracks and gaps, and be sufficiently impervious to contain leaks and spills until they can be pumped out and cleaned. When a leak or spill is discovered the containment area shall be cleaned as soon as possible.

SECONDARY CONTAINMENT AREAS AND MAINTENANCE

NOTES:

INSPECTIONS

- ♦ Secondary containers should be inspected and maintained regularly.
- ♦ Secondary containers should be inspected frequently for:
 - Spills and leaking containers
 - Trash, rain and other build-up
 - Holes and cracks in the secondary container
 - Berm height maintained at a proper levels

TRASH REMOVAL

- ♦ Trash in a secondary container diminishes its capacity to hold a spill, therefore, the containment should be kept free of debris. If trash accumulates, remove the solid debris and absorb liquids with a suitable absorbent. The absorbent must be disposed of properly.

CLEAN-UP SPILLS

- ♦ When spills occur in secondary containment areas, have the spill cleaned up as soon as possible. Entirely clean up spills in the containment area. Ensure that all waste materials generated during clean-up are handled and disposed as hazardous waste.

RAINWATER CLEAN-OUT AND DRAINAGE

- ♦ Rainwater presents some special concerns when secondary containers are exposed to rainfall. If the secondary container is not kept clean, the rainwater can become contaminated, overflow the containment and carry polluted water to adjacent water or soil. Always clean up any spill that occurs in a secondary container that may be exposed to rainfall.
- ♦ Many secondary containers have valves or plugs which can be opened to allow the water to drain. Ensure the plugs or valves are closed after the rainwater has drained. Some containers may need to be pumped or bailed out. If you suspect that the water in the secondary containment to be contaminated for any reason, notify the responsible person or department for removal and clean-up.

SECONDARY CONTAINMENT AREAS AND MAINTENANCE (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To provide proper storage facilities and mixing areas for paint material usage and waste accumulation.

PAINT STORAGE AND MIXING PROCESS

The painting process and operations should provide for proper storage, transfer, mixing, and waste accumulation. In general, all of these processes are frequently accomplished in the same area. The area should be organized and designed in such a manner to minimize spills, and the potential for spills to reach surface waters. Practices should also be followed that identify methods for proper paint material control. Proper material control will include practices for minimizing spills, quick and complete spill clean-up and minimizing excess air releases.

GOOD ENVIRONMENTAL PRACTICES

SECONDARY CONTAINMENT USAGE

- ♦ The storage area or system should be in good condition and with sufficient secondary containment capacity to ensure that any spillage does not soak into the underlying soils or enter nearby surface waters.
- ♦ The secondary containment systems shall be periodically checked to ensure integrity and cleanliness.

PROCESS AREAS AND SPILL CLEAN-UP

- ♦ All mixing, transferring and clean-up should be conducted in a secondary containment.
- ♦ Clean-up materials should be located near waste accumulation, storage, and paint usage areas for quick and effective cleanup. The appropriate shipyard personnel must be knowledgeable of proper use of clean-up materials.

PAINT STORAGE AND MIXING AREA MANAGEMENT

NOTES:

LIDS AND COVERS

- ♦ Drums should be equipped with tight fitting lids and should remain closed when not in use.
- ♦ Solvent contaminated rags, cloths, and materials should be stored in a covered container.
- ♦ Funnels should be used when transferring material and the lid replaced once transferring is completed.

MSDS BOOKS

- ♦ It is always a good idea to have appropriate MSDS's available at the storage, usage and waste accumulation site to all personnel for quick reactions to emergency situations.

PAINT STORAGE AND MIXING AREA MANAGEMENT

(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To store and accumulate wastes in an organized manner in compliance with all federal, state, and local requirements.

WASTE STORAGE IN THE SHIPYARD

Waste storage operations and areas are very similar to those constraints required for paint material storage and mixing areas. Improper storage of hazardous wastes can cause unnecessary leaks and spills in the shipyard, as well as cause unsafe conditions for workers. Additionally, properly storing hazardous wastes will reduce the likelihood for accidents that could injure fellow workers.

Waste storage and labeling is strictly regulated by local hazardous materials management agencies, state hazardous waste laws and federal laws including the Resource Conservation and Recovery Act (RCRA).

GOOD ENVIRONMENTAL PRACTICES

STORAGE CONDITIONS & SECONDARY CONTAINMENT

- ♦ Always segregate incompatible hazardous materials and wastes.
- ♦ Ensure good ventilation and secondary containment are available in the area. The storage area or system shall be in good condition and with sufficient secondary containment capacity to ensure that any spillage does not soak into the underlying soils or enter nearby surface waters.
- ♦ Allow enough aisles space between drums that will allow easy access for equipment and personnel to prevent collisions and spills.
- ♦ Protect drums from extreme heat and cold. This will minimize the likelihood of fire or freezing, which can cause spills and other associated emergencies.
- ♦ Provide ground straps for drums to prevent static electricity discharge from igniting flammable vapors.
- ♦ Keep drums away from floor drains, unless the drains are designed to contain a release of hazardous material or waste.

WASTE STORAGE AND ACCUMULATION REQUIREMENTS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

WASTE ACCUMULATION PROCESS

- ♦ Proper handling of hazardous wastes can prevent personal injuries and environmental incidents that can lead to expensive cleanup and production delays. Always use personal protective equipment to prevent exposure to chemicals when transferring hazardous wastes.
- ♦ Prevent splashes by always using a funnel to transfer liquid from a can to a drum.
- ♦ Ensure that the waste transfer area is well ventilated and/or contains an exhaust ventilation system.
- ♦ Keep all sources of heat, flames, and sparks away from flammable and combustible wastes.
- ♦ Do not mix a hazardous waste with a nonhazardous waste. For example, if you mix a pint of waste degreasing solvent into a drum of clean solvent, the whole drum is now considered a hazardous waste.
- ♦ Never mix hazardous wastes unless you are certain that they are compatible. For example, mixing acidic waste with a waste containing sulfide can create an explosive waste.
- ♦ Check hazardous waste drums regularly, and always before moving the drum. Check for rust and corrosion, dents, leaks, and ill fitting lids.
- ♦ Tighten bung caps before moving a 55-gallon drum of hazardous waste.
- ♦ When transporting, use straps or other forms of restraint to securely hold the drum.

LABELS, SIGNS, AND AREA ACCESS

- ♦ Clearly identify the hazardous waste storage area and hazardous materials storage area with posted signs and warning placards.

WASTE STORAGE AND ACCUMULATION REQUIREMENTS

(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ Limit access to the storage area only to those who require access. This will minimize co-mingling of other waste streams by outsiders.

WASTE STORAGE AND ACCUMULATION REQUIREMENTS (Cont.)

CENTRAL OR GENERAL ACCUMULATION AREAS

- ♦ The Central Accumulation Area is sometimes referred to as the Reclamation Area or General Accumulator Area. This is the area in the shipyard where hazardous waste is transported to be processed and packaged for off-site disposal or recycling.
- ♦ This area can accumulate hazardous waste in a safe and responsible manner for 90 days or less. The 90-day clock starts when the waste is transported to the area.

NOTES:

SATELLITE ACCUMULATION AREAS

- ♦ Each paint area in the shipyard that generates a hazardous waste or wastes is referred to as a "Satellite Accumulation Area".
- ♦ Waste is accumulated in each area in amounts up to 55 gallons for each waste stream (i.e. rags, paint, solvent). The waste is always the responsibility of the Environmental Coordinator. You should become very familiar with the waste stream associated with your area and how your satellite area should be managed.
- ♦ The waste is later transported to the Central Accumulation Area for processing and ultimate disposal or recycling. The department generating the waste shall accumulate and store the waste in its area in compliance with environmental and safety requirements.

EMERGENCY PREPAREDNESS

- ♦ All individuals in the area should be familiar with emergency response procedures. The area should have ready access to emergency equipment, such as fire extinguishers, booms, absorbent material, and decontamination equipment.
- ♦ Have appropriate MSDSs available at the site for a quick reaction to possible emergency situations.

OBJECTIVE

To promote waste minimization, recycling, reuse and proper reclamation techniques in the paint department.

WHY MINIMIZE WASTE AND RECYCLE MATERIALS?

Each year the shipyard spends thousands of dollars to dispose of paint associated hazardous waste and trash. Cost of disposal is important, although costs associated with the initial paint purchase and excessive (potentially needless) handling is also very important. Efforts made to reduce the amount of waste generated by the shipyard will save the shipyard time, money, and reduce the resulting workload of paint associated crafts.

POLLUTION PREVENTION ISSUES

Waste minimization, material reuse, and recycling are all forms of pollution prevention and cost reduction. It is cost effective and environmentally effective when paint materials are properly used, managed, and recycled. When paints are oversprayed or disposed as waste, the potential for pollution can occur. When life cycle costs of job tasks include waste disposal, all pollution prevention strategies are often very cost effective and worth the shipyard's efforts.

It is always good environmental practice to analyze your operations to identify ways to reduce waste and minimize potential pollution.

GOOD ENVIRONMENTAL PRACTICES

WASTE IDENTIFICATION AND COST ANALYSIS

- ♦ Segregate waste streams to prevent co-mingling of hazardous waste and trash, thereby decreasing the volume of hazardous waste. For maximum efficiency, waste streams should be segregated at the point of generation, prior to transportation to other areas of the shipyards for disposal, reuse or reclamation.
- ♦ Calculate the cost of waste disposal into each job task. Some tasks may not be profitable if the waste disposal costs are too high.

PAINT WASTE MINIMIZATION AND RECYCLING

NOTES:

ANALYZE YOUR JOB FUNCTIONS

- ♦ Understand what kinds of waste are generated from your work tasks in your area. Think about what you can do to reduce the amount of each type of waste during operations.
- ♦ Consider each step in the waste stream generation process to look for changes that can reduce the volume or hazards of the waste.
- ♦ Recover and reclaim materials “in line” whenever practical. Reuse waste materials in the same job task if the materials still meet specification. If practical, reuse waste materials in other job tasks.

PURCHASING PRACTICES

- ♦ Never purchase or withdraw from storage more material than you need for a specific task or job. Rotate stock so that the shelf-life of the material does not expire before use. Recommend to your suppliers that they adopt just-in-time material delivery whenever possible.

SHIPYARD PAINT EXAMPLES:

- Recycling clean-up and surface preparation solvents using solvent distillation equipment.
- Reusing solvents several times for paint gun clean-up can save shipyard cost of clean-up solvent.
- Analyzing and measuring job size and using proper mixing amounts will minimize the amount of paint left over, which will be considered waste.

PAINT WASTE MINIMIZATION AND RECYCLING (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To minimize the amount of paint overspray and increase overall transfer efficiencies while painting throughout the shipyard.

POLLUTION PATHWAYS AND PAINT SOLIDS

In a typical shipyard painting application, only 60 to 80% of the paint materials actually end up on the part being sprayed. This means that anywhere from 20 to 40% of the paint materials does not adhere to the structures being painted and becomes overspray. This overspray can end up in the environment and/or inhaled by fellow workers. Therefore, it is always desirable to reduce overspray as much as possible.

Paint solids that are not transferred to the product either fall to the surface below or become airborne and blown to other areas inside or outside the shipyard. Pollution can occur when the paint particles become airborne and blown into adjacent water or other areas outside the shipyard. If the paint particles land on surfaces outdoors, rainwater can carry the particles to local surface waters. Good environmental practices will be directed at minimizing the amount of overspray experienced in the shipyard.

GOOD ENVIRONMENTAL PRACTICES

IMPROVE PAINTING TECHNIQUES AND PRACTICES

- ♦ Minimize over-spray through use and training of perpendicular painting techniques.
- ♦ Small parts should be painted with spray patterns appropriate for the size of the parts. Small parts should have a small pattern while a larger spray pattern is more appropriate for larger parts and surfaces.
- ♦ Reduce spray-gun air pressure or liquid pressure to maximize transfer efficiency and reduce over-spray.
- ♦ Consider racking parts in a manner that allows overspray to land and adhere to other parts or paintable surfaces.

MINIMIZE OVERSPRAY AND INCREASE TRANSFER EFFICIENCY

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ Improperly operating paint equipment can cause excessive overspray. Always maintain paint guns and ensure they are operating properly. Paint guns that are not operating correctly should be fixed or replaced immediately.
- ♦ Accurately estimate the amount of paint needed for each job task in order to reduce the amount of waste generated.

IMPROVED APPLICATION EQUIPMENT

- ♦ Investigate and apply more efficient and higher transfer efficiency equipment (i.e. Plural Component painting equipment, High Volume Low Pressure (HVLP), Airless, Electrostatic Spraying, Roll-coating, Dip-coating, Flow-coating, Brush-coating, etc.).

OTHER MEASURES

- ♦ Cease painting in windy conditions. Shipyard painting should be conducted only if satisfactory transfer efficiencies can be achieved. High wind speeds can diminish transfer efficiencies to an undesirable level.
- ♦ Minimize painting performed in cross-draft wind, especially on large flat surface areas where wind velocities can severely reduce transfer efficiency and cause overspray to become airborne.
- ♦ Install and utilize containment screening to contain fugitive paint in areas where over-spray can cause pollution in the shipyard or be blown off-site.
- ♦ Paint in enclosed areas to help contain paint over-spray whenever possible.

MINIMIZE OVERSPRAY AND INCREASE TRANSFER EFFICIENCY

(Cont.)

NOTES:

OBJECTIVE

To reduce particulate matter emissions from painting operations in shipyards through implementation containment shrouding and wind screens.

CONTROLLING PAINT PARTICULATES

In a typical shipyard painting application, anywhere from 20 to 40% of paint materials does not adhere to the product. Paint solids that are not transferred to the product either fall to the surface below or become airborne and end up in other areas of the shipyard. This means that the particulate has the potential to become out of control and pollute the environment and/or inhaled by fellow workers. Pollution can occur when the paint particles become airborne and blown into adjacent waters or other areas outside of the shipyard. If the paint particles land on a surface outdoors, rainwater can carry the particles to local surface waters. In order to minimize the potential release of paints to surface waters, the air, ground and fellow workers, good environmental practices should include the installation of containment shrouding and wind screens wherever practical.

GOOD ENVIRONMENTAL CONTAINMENT PRACTICES

Practices should be followed in the following outdoor shipyard areas:

- ♦ **Dry-Docks (Graving, Floating, Marine Railways, etc.)**
- ♦ **Wet Berth Painting Operations**
- ♦ **Superstructure Painting**
- ♦ **All Large Outdoor Painting Operations**
- ♦ **Small Painting Operations close to surface waters**

OUTDOOR CONTAINMENT PRACTICES

- ♦ Evaluate use of containment methods and materials such as shrink wrapping, plastic shrouding, or screening for use in all outdoor areas in need of paint overspray containment.

OUTDOOR PAINT OVERSPRAY CONTAINMENT

NOTES:

- ♦ Installing containment systems such as tarpaulins, shrouds or portable structures are excellent for minimizing airborne particles from entering surface waters and causing pollution. Shrouds can serve to “catch” particulate overspray and they can serve to “block” or slow winds that cause excessive overspray.
- ♦ In most situations shrouds should be large enough to fully enclose the operation. This will segregate the working area and provide a surface area that can be swept-up and/or vacuumed to remove paint particulates.

**OUTDOOR PAINT
OVERSPRAY
CONTAINMENT**

NOTES:

DESIGN AND ENGINEERING

- ♦ Proper design, construction, and position of the shrouding is important to the system’s overall containment effectiveness. Support structures such as scaffolding and other steel members are frequently used in conjunction with shrouding in order to withstand potential stresses imposed by wind. Ensure that all shrouding systems are approved by the shipyard department responsible for such systems, such as rigging engineering or facilities engineering.

WINDY CONDITIONS

- ♦ Establish a policy to curtail painting operations during high wind conditions and/or during wind directions that direct overspray to surface waters. Also, avoid painting in cross winds that severely reduce transfer efficiency.

HEALTH AND SAFETY

- ♦ When full containment systems are in use, ensure that individuals working wear proper protective equipment.
- ♦ Ensure that the area is properly ventilated with explosion proof fans and ducting systems.

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To minimize particulate matter and VOC emissions from painting operations in booths, tanks and enclosed compartments through implementation of preventive maintenance and improved environmental practices.

SHIPBOARD TANKS AND COMPARTMENT PAINTING

Shipyards painting operations are frequently performed in cabinets, booths, and inside tanks and other enclosed compartments onboard ships. Booth and/or cabinet painting equipment is primarily used to prepare small parts, or plates with primer prior to assembly or final coating application. In many cases, paint booths environmentally require permits to operate, which place operational restrictions on the operation of the booth.

Indoor painting generally occurs in very large buildings. The building serves to control the environment, keeping out wind, rain and maintain proper temperature. On the other hand, tank and compartment painting is conducted onboard the ship. Tanks and compartments under repair, or new construction, require painting. During painting operations, the compartment is sealed from other compartments and air is drawn from the compartment with ventilation systems.

GOOD ENVIRONMENTAL PRACTICES:

AREA EVALUATION

- ♦ Inspect and ensure that the enclosed area is free of leaks, holes, gaps and other openings that could let oversprayed paint escape the area. If holes or gaps are discovered, have them covered before painting begins.
- ♦ For spill protection, ensure that the area where paint is mixed inside the painting area has secondary containment.
- ♦ Ensure that all spill pathways (freeports, drainage channels, etc.) to surface waters are identified and blocked with some type of containment.

BOOTHS, CABINETS AND ENCLOSED TANK/COMPARTMENT PAINTING

NOTES:

IMPROVED PAINTING PRACTICES

- ♦ When painting tanks or inside compartments, do not paint close to air ventilation exhausts. The paint spray can clog up the filters and paint spray particulates can exit through the ventilation system into the atmosphere. Also, close off other access to the compartment with plastic sheeting to minimize release of VOCs or particulates to other spaces in the ship.
- ♦ Always cover paint and solvent containers in the work area to minimize VOC emissions.
- ♦ Use proper painting techniques and paint equipment maintenance to minimize overspray and increase transfer efficiency.

AREA CLEAN-UP

- ♦ Sweep and vacuum up compartment and areas after painting is complete. This will remove paint dusts that could otherwise be transferred to the environment. Always dispose of paint debris and dusts appropriately.

PAINT BOOTH PREVENTIVE MAINTENANCE

- ♦ Set up a preventive maintenance program to ensure proper fan and ventilation operations. All process variables should be maintained to meet permit requirements or paint specifications.
- ♦ If the painting function is semi-automatic, maintain paint guns to minimize leaks and poor spray patterns. Ensure that spray patterns minimize overspray waste.
- ♦ Clean paint booths to remove excess paint overspray. Control of this waste will help to ensure that it does not reach a pollution pathway and end up in the environment.

FREQUENT INSPECTIONS

- ♦ Inspect paint equipment including pots, hoses, and baghouses for breaks, holes, and leaks regularly. (See Painting Self Inspection Checklist)
- ♦ Ensure cabinet and booth filters are installed properly, in good condition, and are free of blockage.

BOOTHS, CABINETS AND ENCLOSED TANK/COMPARTMENT PAINTING

(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

Paint Booth Usage And Inspection Form

Inspect Paint Booth Operations on a periodic basis identifying problems with an **X** and no problems with an **OK**.

Week of:

Inspection Points	Mon	Wed	Fri	
Using Compliant Coating Material				VOC limits and Other Constraints
Proper Thinning				Compliance
Proper Mixing Ratios				Compliance
Proper Mix Ratios Posted				Suggested Idea
Guns Cleaned Thoroughly and properly lubricated				Procedures In-Place and Followed
Minimize Solvent Surface Preparation				Improved Practices
Proper Cleaning Solvent				Environmental Approval and Compliant
Proper Clean-up Methods				Procedures In-Place and Followed
Filters Maintained and In-Place				Proper Condition
Closed Paint, Solvent and Associated Waste Cans				Lids Closed When Cans Are Not Directly In Use
Spray Equipment Cleaned in Closed Containers				Procedures In-Place and Followed
Proper Pressure Drop and Operational Manometer				Proper Condition
Water Curtain Operational				Proper Condition
Control Equipment Operational				Proper Condition
Exhaust Fan and Ducting				Operational and Sealed
Permits Displayed				In The Open
Secondary Containment and Clean-Up Equipment				In Place and Ready
Usage Recordkeeping				Keeping Track of Material Usage
Appropriate Safety Gear				Used and In-Place
Inspector's Initials				

OK = No Problems Identified

X = Problem Identified

NA = Use NA for areas that are Not Applicable to your operations

Note: Notify Department Supervisor of Problem Areas

BOOTHS, CABINETS AND ENCLOSED TANK/COMPARTMENT PAINTING

(Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To reduce volatile emissions from solvent wiping operations through process modification, material substitution, work practice changes, and equipment modification.

BACKGROUND INFORMATION

Solvent wiping is an integral part of surface preparation prior to various shipyard painting operations. Generally, solvent wiping is a cleaning process employing solvents to dissolve or displace contaminants from surfaces to be painted. An operator accomplishes surface preparation cleaning by wiping the contaminated or dirty surface with a solvent dampened wiper (rag, paper, etc.). Chlorinated solvents, aromatic solvents, and terpenes are widely used for solvent wiping surface preparation operations. Solvent wiping is a labor intensive task that has a significant potential for unwanted emissions of VOCs, ozone depleting substances (ODSs), HAPs and other listed substances. The emissions can affect the environment, the worker and fellow workers.

The type of solvent used for surface preparation and the operator's cleaning practices or methods can effectively reduce emissions. Good environmental practices will minimize emissions and increase worker productivity.

GOOD ENVIRONMENTAL PRACTICES

EVALUATE THE CLEANING PROCESS

- ♦ The following questions should be asked in order to fully evaluate your solvent wiping needs and evaluate if there is opportunity to minimize emissions by using a different cleaning process or replacing the solvent used with a more environmentally friendly product.
- A) What are the surface cleanliness requirements?
- B) Is cleaning a necessary step in the whole process?
- C) How clean does the surface need to be?
- D) Can different methods replace wipe cleaning? For example, abrasive blasting, sanding, grinding, etc.
- E) Can the work be accomplished more efficiently with another method?
- F) Can an alternate solvent or aqueous cleaner be used to replace high VOC, ODSs, or other toxic solvents?

SOLVENT WIPING SURFACE PREPARATION

NOTES:

SOLVENT RAG DISPOSAL PRACTICES

- ♦ Used solvent-wipe rags should always be disposed immediately in a covered container. Provide containers with covers at or near the work area.
- ♦ Line solvent rag containers with a plastic liner for better retention of solvent and its vapors. Empty “job-site” containers in a larger storage drum with a sealed lid on a daily basis.

SOLVENT APPLICATION PRACTICES

- ♦ Apply volatile solvents directly to the rag and always avoid spraying solvent directly on the surface being cleaned.
- ♦ Use plungers and squeeze bottles to transfer solvent to a wiper. Discourage direct transferring of solvent from drums or large containers to the wiper material to prevent spills and over saturating the wiper.

CLEANING SMALL AREAS

- ♦ It is frequently advantageous to clean small areas at a time to minimize the amount of solvent loss to evaporation during use.

SOLVENT WIPING SURFACE PREPARATION (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

Inspect and evaluate paint area compliance with all good environmental practices.

Inspections are a normal part of shipyard paint area management. Supervisors of paint departments with waste accumulation areas are responsible for inspections along with their Environmental Coordinators. Inspections and performance evaluation are valuable tools used to feed back information to the area worker on how they are doing. Incentive programs can coincide with the inspection checklist and individuals can be recognized for their contributions. Inspections should be performed on a regular basis such as weekly, daily or monthly. An inspection form should be developed and maintained by the area supervisor and results reported back to the appropriate department personnel.

PERFORM SELF-INSPECTION ON A REGULAR BASIS

Develop a self-inspection performance evaluation program that is designed to maintain GEPs in the following areas:

- ♦ Good housekeeping: areas are cleaned-up and organized
- ♦ Proper storage: Paint & solvent containers have lids and are sealed. Secondary containment areas are provided and are properly maintained
- ♦ Complete recordkeeping for paint usage and waste accumulation
- ♦ MSDSs are available and up-to-date
- ♦ All paint equipment is in good operational condition (no leaks or poor spray patterns)
- ♦ Secondary containment in place, free of debris, and maintained
- ♦ Clean-up response equipment is readily accessible
- ♦ Proper waste storage and segregation in the waste accumulation area
- ♦ Containment curtains and screening are in place in critical areas where needed

PAINT CRAFT AREA INSPECTION

NOTES:

***CRAFTING QUALITY ENVIRONMENTS THROUGH
GOOD ENVIRONMENTAL PRACTICES***

PAINT GEP Performance Evaluation Checklist Form

Evaluate various GEP subject areas on a periodic basis to ensure proper operation and adherence to procedures. Evaluations should be conducted by environmental personnel or a designated Environmental Coordinator.

Date: _____ **Time:** _____ **AREA:** _____

Evaluator: _____

Responsible Area Employee or Department: _____

Evaluate the Following:	Evaluator Comments	Remedy and Follow-up Items
GEP Procedures Followed		
Containers Covered in the Area		
Consistent, Accurate, and Easily Accessible Recordkeeping Information		
Proper Installation and Usage of Containment Systems (Tarps and Shrouds)		
Good Housekeeping followed in the Area (Minimized Potential for spill)		
Secondary Containment in Place (Storage and Mixing Areas)		
Paint Equipment in Good Operational Order (Preventive Maintenance)		
Employee Awareness of GEPs in the Area		

**PAINT CRAFT
AREA
INSPECTION
(Cont.)**

NOTES:

ENVIRONMENTAL TRAINING MODULES

MODULE 2

Shipyard Craft Specific Training

ENVIRONMENTAL PREVENTIVE MAINTENANCE

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

PREVENTIVE MAINTENANCE TABLE OF CONTENTS

ENVIRONMENTAL PREVENTIVE MAINTENANCE (1-PM-INTRO.DOC)

OBJECTIVE To implement preventive maintenance measures that reduce the potential for accidental leaks and excessive operational emissions.

BOILER OPERATIONS (2-BOILER.DOC)

OBJECTIVE To minimize emissions generated by operating boilers through proper maintenance, fuel substitution, and improved management practices.

INTERNAL COMBUSTION ENGINES (3-COMBUST.DOC)

OBJECTIVE To reduce emissions from internal combustion engines (ICE) through implementation of preventive maintenance and process modifications.

DRYING OVENS AND FURNACES (4-OVEN.DOC)

OBJECTIVE To reduce the potential for emissions from drying ovens and furnaces through improved operational practices and procedures.

SOLVENT DISTILLATION UNITS (5-STILL.DOC)

OBJECTIVES To implement practices that minimize the potential for spills and excessive VOC emissions from solvent distillation operations.

COOLING TOWERS (6-COOLIN.DOC)

OBJECTIVE To minimize the potential for toxic emissions from cooling towers.

VARNISH DIP TANKS (7-DPTNK.DOC)

OBJECTIVE To reduce fugitive emissions and the potential for environmental incidents from varnish dipping processes through work practice modification, equipment modification, and employee awareness.

FUEL STORAGE AND TRANSFER OPERATIONS (8-FUEL.DOC)

OBJECTIVE To minimize the potential for VOC emissions and spills caused during fueling operations and fuel storage.

WASTEWATER TREATMENT UNITS (9-WSTWAT.DOC)

OBJECTIVE To minimize the potential for spills and air emissions from wastewater collection, treatment, and storage operations.

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE

To implement preventive maintenance measures that reduce the potential for accidental leaks and excessive operational emissions.

ENVIRONMENTAL PREVENTIVE MAINTENANCE

Most shipyards have a maintenance program to maintain production support equipment and systems. In some cases, the maintenance program may only consist of repairing or replacing broken and/or worn out equipment. This breakdown type of maintenance procedure is not considered a good practice, especially if broken or improperly operated equipment results in excessive emissions, spills, leaks, and/or other potential environmental and safety hazards.

An effective environmental preventive maintenance program contains proactive procedures and practices that extend equipment life through proper operation, periodic maintenance inspections, corrective actions, and performance testing. Preventive maintenance will generally reduce breakdown frequency, increase equipment life, and reduce the overall cost of equipment maintenance. An environmentally conscious preventive maintenance program will include practices and procedures designed to minimize the potential for excessive emissions and accidental environmental releases.

Shipyards preventive maintenance programs should address equipment and process including but not limited to the following:

- ♦ Refrigeration and Air Conditioning Systems,
- ♦ Plating Tanks (e.g., Cyanide Plating Solution),
- ♦ Internal Combustion Engines and Equipment
- ♦ Boiler Systems,
- ♦ Halon Fire Systems,
- ♦ Dust Collection Systems and Baghouses,
- ♦ Paint and Grit Blasting Booths and Containment Systems, and
- ♦ Solvent Stills.

GOOD ENVIRONMENTAL PRACTICES

PROCESS AND EQUIPMENT ANALYSIS

- ♦ Identify all equipment, systems, and processes that have potential for excess emissions or pose environmental risks for spills and leaks due to improper operation and/or breakdowns.

ENVIRONMENTAL PREVENTIVE MAINTENANCE

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

DEVELOP PROCEDURES IN YOUR AREA

- ♦ Integrate environmental concerns into any existing preventive maintenance procedures in your area. Identify any environmental concerns that are already integrated in the program and ensure that they are consistent with good practices.
- ♦ If no preventive maintenance procedures are in place, determine and develop procedures and practices to maintain appropriate equipment adjustment, operational condition, required repair, and replacement of parts. Ensure that replacement parts are available, especially parts that are integral to environmental preservation and proper equipment operation.

INSPECTIONS PLAY A VITAL ROLE

- ♦ Include procedures for frequent inspections and testing of plant equipment and systems, especially systems that could break down, go out of adjustment, or fail and result in environmental releases or other hazardous conditions.
- ♦ Set-up a system of forms and records for inspections and testing to be maintained in an organized manner. Inspection forms are a convenient and organized approach to preventive maintenance. They include a check off of items inspected and tested, and identify the date and equipment operation.

RECORDKEEPING

- ♦ Consistently store and retrieve all maintenance records including repairs, new parts, equipment change-out, and all corrective actions for each equipment and/or system.

ENVIRONMENTAL PREVENTIVE MAINTENANCE (Cont.)

NOTES:

OBJECTIVE

To minimize emissions generated by operating boilers through proper maintenance, fuel substitution, and improved management practices.

Boilers are essentially closed vessels and tubes containing water in combination with a heat source and a steam transfer system. Water is converted into steam when heated under increased pressure and other controlled conditions. Fuels most commonly used as the heat source for boilers are natural gas, oil, and diesel. A flame heats water contained in the boiler, which makes steam. The steam is used for many processes within a shipyard and on-board ships including supplying auxiliary power, generating electricity, heating, hydraulic steam system operations, powering heating and air conditioning..

The emissions from a boiler are mainly determined by the fuel type, the size and type of the boiler, loading practices, and the level of equipment maintenance. The most common emissions from boilers are oxides of nitrogen (NOX), particulate matter <10 microns (PM₁₀), oxides of sulfur (SOX) and carbon monoxide (CO).

GOOD ENVIRONMENTAL PRACTICES

PROPER OPERATION AND MAINTENANCE

- ♦ All boilers operate more efficiently and produce less air pollution when they are maintained properly. Set up a preventive maintenance program for boilers. The program may vary depending on the boiler type, components, and the manufacturer. This may include metering gas usage and logging hours of operation to determine maintenance requirements.
- ♦ Ensure that operating and maintenance procedures are followed as described in the manufacturer's specifications. It is essential that these instructions be carried out accordingly, to ensure continuous, safe, efficient, and environmentally sound operation.

FUEL SUBSTITUTION AND EQUIPMENT MODIFICATION

- ♦ Emissions can be reduced by choosing "cleaner" fuels. Natural gas is generally considered to be one of the cleanest fuels available. Investigate using "cleaner" fuels whenever possible.

BOILER OPERATIONS

NOTES:

- ♦ Reductions in NOX, SOX, and PM10 emissions can be achieved through combustion modifications such as low NOX burners, low excess air, staged combustion, flue gas recirculation systems, and/or the use of low sulfur fuels. Investigate the alternatives when replacing combustors and/or complete boilers.

**BOILER
OPERATIONS**
(Cont.)

PROCEDURES AND PRACTICES

NOTES:

- ♦ In general, tap water should not be used in boilers. Several types of water treatment must be performed on feed water before it can be used in the boiler. This will help prevent corrosion and premature equipment breakdown, which can lead to environmental releases.
- ♦ Boiler blowdown is a procedure used to remove impurities in the water that can cause corrosion and scale and result in boiler tube failure. Blowdown should be performed regularly and blowdown waters should not be discharged to the environment.
- ♦ Sootblowing should be performed to remove soot and ash from the fire side of the boiler tubes and heat recovery equipment to achieve a higher combustion efficiency. Higher efficiency means less pollution.

CONTAINMENT AND STORAGE

- ♦ When boilers are placed in an area that has direct pathways to adjacent waters, it is a good idea to utilize secondary containment to capture any spills (boiler water or fuel) caused by system failure or human error.

MAINTENANCE AND OPERATIONAL EDUCATION

- ♦ Boilers can be complicated systems; operators and maintenance persons should be properly trained on all aspects of the boiler equipment that they are operating and maintaining. A properly maintained boiler will ensure that air pollutants will be kept to a minimum.

OBJECTIVE

To reduce emissions from internal combustion engines (ICE) through implementation of preventive maintenance and process modifications.

ICEs are used to support a wide array of shipbuilding and repair operations in shipyards. They are predominantly found as integral components in support equipment such as forklifts, cranes, trucks, cars, motorcycles, barges, and outboards. They are also used for emergency power generation for ships and shipyard facilities such as buildings, fire pumps, graving docks, and floating dry-docks. ICEs also provide support functions for many shipyard processes which include: electric arc welders, vacuum systems, pumps, portable dust/fume collectors, and air compressors that provide air supply for breathing, grit blasting, and hydroblasting.

An ICE operates by burning an air/fuel mixture in a chamber or a cylinder. They operate on fuels such as compressed natural gas, propane, gasoline, and diesel oil. Rotational power is generated when the heated air/fuel mixture expands pushing a piston down in the cylinder which in turn, drives a crankshaft to rotate. This rotation can generate electricity through a generator, mechanical movement, or both depending on the application.

ICEs produce particulate matter (PM₁₀), hydrocarbon, sulfur oxides (SOX) and nitrogen oxides (NOX) emissions which are federally listed criteria pollutants. PM₁₀ emissions are a result of incomplete combustion of fossil fuels and excessive operation. Hydrocarbon emissions can come from fueling equipment, passive fuel evaporation from the fuel tanks and engine systems. SOX emissions result from combustion of sulfur containing fossil fuels. NOX emissions are generated from incomplete combustion of fossil fuels.

GOOD ENVIRONMENTAL PRACTICES

ESTABLISH PREVENTIVE MAINTENANCE

- ♦ All ICEs operate more efficiently and produce less air pollution when they are maintained properly. Set up a preventive maintenance program for ICEs, which will vary depending on the manufacturers specifications and equipment age. This may include recording gas usage and logging hours of operation to determine maintenance requirements and time intervals.

INTERNAL COMBUSTION ENGINES

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ Ensure that operating procedures are followed as described in the manufacturer's specifications. It is essential that these instructions be carried out accordingly, to ensure continuous, safe, efficient, and environmentally sound operation.
- ♦ Establish an inspection checklist and inspect equipment routinely. This is a very important step with respect to preventive maintenance. Please see Internal Combustion Engine Operator Self Inspection Checklist on the following page and use it as an example for a checklist in your area.
- ♦ Set-up a recordkeeping system and maintain recordkeeping for operating hours, fuel consumption, and combustion parameters.
- ♦ Immediately repair all ICEs with excessive visible emissions, noise, and/or leaks from operation.

POTENTIAL PROCESS MODIFICATIONS

- ♦ Evaluate fuel constituents and examine the feasibility of using alternative "clean fuels."
- ♦ Investigate modifying combustion parameters for increased equipment efficiencies.

WORK PRACTICE CHANGES

- ♦ Encourage use of bicycles or walking within the shipyard.
- ♦ Reduce vehicle traffic speed in the shipyard to increase safety and reduce emissions.

INTERNAL COMBUSTION ENGINES (Cont.)

NOTES:

**Internal Combustion Engine
Operator Self Inspection Checklist**

Equipment or Permit No.

Inspection Points		Mon	Wed	Fri
Location (portable units)				
Purpose (test/emergency)				
Hours Meter Reading				
Fluid Levels	Oil			
	Coolant			
Visible Leaks	Oil			
	Coolant			
	Fuel			
Flow Meter Readings	Injection Water			
	Ammonia			
	Fuel			
Excess Smoke				
Other 1:				
Other 2:				
Operator's Initials	1st shift			
	2nd shift			
	3rd shift			

NOTE: OK = No problems identified
 X = Problem identified

Notify the Maintenance Department of all identified problems.

**INTERNAL
COMBUSTION
ENGINES**
(Cont.)

NOTES:

OBJECTIVE

To reduce the potential for emissions from drying ovens and furnaces through improved operational practices and procedures.

FURNACES AND DRYING OVENS IN THE SHIPYARD

Furnaces and ovens are usually high temperature ovens used for foundry operations such as metal and plastic molding, metal heat treatment, and forging. Furnaces are also used for material “burn-off” of motor varnish, paints, and/or grease and dirt from parts. Drying ovens are usually lower temperature units used to accelerate drying of varnish for motors, adhesives, paints, and plastics. Both drying ovens and furnaces can range in size from very small to very large.

POTENTIAL EMISSIONS

During furnace and drying oven operations, emissions are derived from either the combustion heat source or the part being processed within the oven. Ovens and furnaces of concern are heated by either fuel oil combustion or natural gas combustion. Both of these combustion processes produce NOX, VOC, and particulate matter (PM) emissions. Combustion emissions can be minimized through proper operational performance. On the other hand, parts processed within the furnaces and ovens mainly produce VOC emissions and in some cases of material “burn-off,” PM emissions can be released. A variety of measures can be taken to minimize releases caused by parts being processed which mainly include alternative part cleaning methods and VOC containing material substitution.

GOOD ENVIRONMENTAL PRACTICES

PREVENTIVE MAINTENANCE

- ♦ Include all drying ovens and furnaces in the shipyard preventative maintenance program. This will help ensure that they operate more efficiently and produce less air pollution when they are maintained properly. Set-up a preventive maintenance program for each furnace, which will vary depending on the manufacturer’s specifications and equipment age.
- ♦ Ensure proper recordkeeping, which generally includes recording usage and logging hours of operation to determine maintenance requirements and time intervals.

DRYING OVENS AND FURNACES

NOTES:

WORK PRACTICE MODIFICATIONS

- ♦ Clean parts before furnace burn-off operations. Remove excess paint, varnish, grease, and other petroleum products that can lead to reductions in VOC emissions.
- ♦ Maintain operational temperatures and other variables as recommended by the manufacturers' specifications for all ovens and furnaces to ensure proper combustion.
- ♦ Remove oils and other combustibles from products and parts prior to heating and eventual heat treatment.

POTENTIAL EQUIPMENT MODIFICATIONS

- ♦ When replacing existing ovens and furnaces, investigate the use of low NOX combustors.

**DRYING OVENS
AND FURNACES
(Cont.)**

NOTES:

OBJECTIVES

To implement practices that minimize the potential for spills and excessive VOC emissions from solvent distillation operations.

SOLVENT USAGE AND RECYCLING

Large volumes of solvents are used for various production requirements in shipyards. The majority of solvent is used for paint surface preparation, equipment cleaning, and paint thinning. Similarly, solvent is also frequently used for maintenance cleaning, which involves either hand wiping or solvent tank dipping. A significant amount of these solvents used in the shipyard can be reused or recycled several times before being discarded.

SOLVENT DISTILLATION

The most common technique used for solvent recycling is distillation. With this method, the solvent is heated to its boiling point and the resulting purified vapor is withdrawn, condensed, and collected for reuse. As the solvent boils, vapors form and pass through a series of piping, hoses, valves, and fittings before the vapor is condensed and stored in a holding tank. It is this cycle of turning the solvent into a vapor and back into a liquid that has the greatest potential of releasing VOCs. Caution must be used during the processing and recovery of used solvent to prevent the release of fugitive air emissions and spills.

GOOD ENVIRONMENTAL PRACTICES

INSPECTIONS, MAINTENANCE, AND RECORDKEEPING

- ♦ Develop a preventive maintenance program designed to ensure that the vapor collection and/or vapor recovery/disposal systems are working properly.
- ♦ Inspect all vapor transfer paths for leaks. Vapor transfer paths include the combination of piping, hoses, valves, fittings, storage tanks, and other devices through which VOC vapors are transferred.
- ♦ Ensure that the seal on the unit's processing tank lid is not damaged and seals properly. If it is damaged, it should be repaired immediately.

SOLVENT DISTILLATION UNITS

NOTES:

- ♦ Maintain records of total recycled solvent throughput on the unit for every calendar month. Keep monthly records for at least two years. (See Recycled Solvent Distillation Unit Recordkeeping Form)

**SOLVENT
DISTILLATION
UNITS
(Cont.)**

EQUIPMENT MODIFICATION

- ♦ Ensure that the unit has a vapor recovery/disposal system designed to minimize VOCs from exiting the unit and entering the atmosphere.

NOTES:

AREA CONTAINMENT AND CLEAN-UP MATERIALS

- ♦ Utilize secondary containment for all equipment areas, material and waste storage areas and material transfer areas. The contained areas should meet all requirements of secondary containment as defined in GEP - Secondary Containment.
- ♦ Ensure that the solvent recycling areas have ample clean-up materials and trained employees for small spill accidents.

SOLVENT TRANSFER OPERATIONS

- ♦ Carefully transfer used (recyclable) solvent from the accumulation drums to the unit's processing tank. Avoid splashing solvent and do not overfill the tank.
- ♦ Ensure that all solvent transfer operations are performed in a secondary containment area with proper funnels, pumps and other transfer equipment, necessary to reduce VOC emissions during transfer operations.
- ♦ Ensure that all workers wear proper protective equipment including splash-proof eyewear, gloves, and proper clothes.
- ♦ Keep lids on all used and recycled solvent containers when not adding or removing materials.

**Recycled Solvent Distillation Unit
Recordkeeping Form**

NOTES:

Date	Still Activity Totals				Recycled Inventory	
	Total Received	Total Processed	Total Sludge	Total Reclaimed	On Hand	Issued

SOLVENT DISTILLATION UNITS
(Cont.)

OBJECTIVE

To minimize the potential for toxic emissions from cooling towers.

COOLING TOWERS

A cooling tower is a device in which circulating water evaporates to remove heat from a process, a building, or a refrigerator, and transfers the heat into the ambient air. The definition of a cooling tower includes, but is not limited to, evaporative condensers, quench towers, and cooling towers used in heating, ventilation, cooling, or air conditioning processes.

Cooling towers require a large volume of water due the high rate of evaporation. Most cooling towers require frequent chemical treatment of the cooling water to prevent the build up of corrosion, scale, and bacterial growth. It is the high rate of evaporation combined with the chemical treatment that has the potential to cause potentially toxic air emissions. Hexavalent chromium (Cr^{+6}) has been widely used and has shown to be very effective in the elimination of corrosion, scale build-up, and bacterial growth. This form of chromium is very toxic to humans and the environment.

Many state and local air pollution control agencies have developed regulations that prohibit the use of hexavalent chromium-containing compounds used in cooling tower circulating water.

GOOD ENVIRONMENTAL PRACTICES

MATERIAL SUBSTITUTION

- ♦ Investigate substitute corrosion inhibitors and anti-scalants for hexavalent chromium compounds that minimize potential environmental impacts. Since many substitutes are recommended for specific types of cooling towers, consult the manufacturer of the cooling tower prior to implementing substitute compounds.

PROCESS MODIFICATION

- ♦ Periodically test the circulating water to determine the concentration of hexavalent chromium. If hexavalent chromium compounds are to be used in cooling towers, keep the hexavalent concentration in the circulating water at less than 0.15 milligrams per liter.

COOLING TOWERS

NOTES:

- ♦ Hexavalent chromium should not be used in wooden cooling towers. The wood may cause the hexavalent chromium concentration to exceed the 0.15 milligrams per liter in the circulating water. Upgrade or replace wooden cooling towers whenever feasible.

PREVENTIVE MAINTENANCE

- ♦ Implement a preventive maintenance program to ensure that all chemical levels are maintained and the cooling tower is operating as designed.
- ♦ Maintain monthly records of analytical results and maintenance for at least two years.
- ♦ Perform frequent inspections to ensure that piping systems, valves, and tanks are not leaking. Leaking fluids must not be transported to receiving waters.

COOLING TOWERS (Cont.)

NOTES:

OBJECTIVE

To reduce fugitive emissions and the potential for environmental incidents from varnish dipping processes through work practice modification, equipment modification, and employee awareness.

VARNISH DIPPING PROCESSES

Electrical insulating varnish is an integral part of power equipment construction and operation. Varnishes offer resistance to vibration and wire separation, and protect the winding and coil from moisture and airborne impurities.

Varnish is generally applied through a dip coating process. The winding, core, stator, and armature of motors are submerged in tanks filled with varnish until bubbles no longer rise to the surface. Depending on the type of varnish used, the components are air cured or forced air cured in a drying oven.

Most common varnishes used in electrical insulation include synthetic resins mixed with solvent carriers such as xylene or toluene. Generally, solvent and thinners comprise up to 50% of most varnishes. Therefore, varnish dipping operations can result in VOC and HAP emissions depending on varnish material composition.

GOOD ENVIRONMENTAL PRACTICES

WORK PRACTICE MODIFICATIONS

- ♦ Keep varnish dip tank covers closed when not in use. As much as five gallons of solvent vapor per day can evaporate from an open tank of solvent mixed varnish.
- ♦ Ensure parts are clean prior to varnish coating. This will ensure proper adhesion and minimize varnish contamination.
- ♦ Keep varnish free of scraps and dirt. This will help to prolong its pot life and ensure varnish performance.
- ♦ Keep varnish temperature as cool as possible to minimize solvent emissions (evaporation) and prolong varnish pot life.
- ♦ Drain and clean dip tanks yearly and filter the varnish before refilling.

VARNISH DIP TANKS

NOTES:

- ♦ Agitate varnish only when necessary. Use mechanical agitation such as stir sticks and mixers. Never use air agitation of varnish.

FACILITY/EQUIPMENT MODIFICATIONS

- ♦ Consider reducing the size of the varnish dip tank. If the size of the tank is much greater in comparison to the parts being varnish dipped, the tank can probably be reduced.
- ♦ Install covers, if not already installed. The cover is the most important control device for varnish tanks. A tight fitting cover will prevent evaporation of solvent, loss of pot life, and excessive emission.
- ♦ Consider installing a small opening in the cover for dipping small components.
- ♦ Keep the equipment in good working condition. Fix leaks or ill fitting covers and connections.

RECORDKEEPING AND INSPECTIONS

- ♦ Keep records of varnish and solvent usage and disposal.
- ♦ Perform self-inspection of varnish tanks for leaks and other defects regularly. (See Varnish Dipping Operations Checklist and Usage Recordkeeping)

PERSONNEL TRAINING

- ♦ Train operators on proper varnish dipping techniques as recommended by the manufacturer and as specified in this document.

ENVIRONMENTAL INVESTIGATIONS

- ♦ Consider replacing high solvent requiring varnish with no-solvent or water-base varnishes

VARNISH DIP TANKS (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

Varnish Dipping Operations Checklist and Usage Recordkeeping

Inspect Varnish Dipping Operations on a periodic basis identifying problems with an **X**, and no problems with an **OK**.

Foreman: _____

Shipyard Usage Location: _____

Varnish Type (Manufacture and ID No.): _____

VOC (Lbs/Gal) _____

MSDS Accessible _____

Week of: _____

Inspection Points	Tue	Thu	
Good Working Order			No Leaks, Working Gauges, Other Defects, Proper Ventilation
Cover Closed			Varnish Tank Lids Should fit Tight and Have No Leaks
Varnish Mixing and Agitation			No Air Agitation, No Excessive Splashing
Parts Cleaned Prior To Dipping			Ensure Proper Surface Preparation
Part Removal			Remove Parts and Part Racks Slowly, Shake Excess Varnish Over the Tank
Varnish Temperature			Keep Varnish Cool to Avoid Evaporation
USAGE			
Make-Up Varnish Added			Gallons of Make-Up Varnish Added
Make-Up Solvent Added			Gallons of Make-Up Solvent Added
Varnish Removed For Portable Usage			Gallons of Varnish Removed for Usage
Varnish and Sludge Disposed			Gallons Removed for Disposal
Inspector's Initials			

OK = No Problems Identified

X = Problem Identified

NA = Use NA for areas that are Not Applicable to your operations

Note: Notify Department Supervisor of Problem Areas

Comment on Problems Identified:

VARNISH DIP TANKS (Cont.)

NOTES:

OBJECTIVE

To minimize the potential for VOC emissions and spills caused during fueling operations and fuel storage.

SHIPYARD FUELING OPERATIONS

Shipbuilding and repair facilities perform a wide range of fueling operations. Many facilities have underground and above-ground storage tanks used for supplying fuel to maintenance and production equipment. Similarly, some shipyards employ fuel tank trucks and portable tanks that supply fuel to equipment and ships. Fuel is transferred to cranes, transportation equipment (e.g. forklifts), automobiles, and ships. The frequency of fueling will be driven by production levels and varying maintenance requirements.

FUEL, EMISSIONS, AND VAPOR RECOVERY

Shipyards generally store and/or transfer diesel, gasoline, and jet fuel for shipbuilding and repair operations. Emissions from fueling and storage consist of VOCs such as benzene, hexane, toluene, and several others depending on the type of fuel. Emissions can occur from several types of fueling operations. The four fuel transfer configurations that are most widely used include splash filling, submerged filling, phase I vapor recovery, and phase II vapor recovery.

Phase I vapor recovery involves recovering fuel vapors caused by tank trucks delivering fuel to shipyard storage tanks. On the other hand, phase II involves recovering fuel vapors at the pump while transferring fuel to shipyard equipment tanks. Many shipyards are not required to install and maintain phase I and/or phase II vapor recovery systems. Shipyards that are required to use phase I and II vapor recovery should review their permits and develop specific procedures to maintain compliance.

GOOD ENVIRONMENTAL PRACTICES

INSPECTIONS AND RECORDKEEPING

- ♦ Periodically inspect and ensure that all seals and gaskets on fuel storage tanks are in good operating condition and that caps on the tanks are replaced and sealed properly. Replace gaskets and seals, when necessary. (See Gasoline/Diesel Pump Self Inspection Checklist)

FUEL STORAGE AND TRANSFER OPERATIONS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ Track and record all fuel usage quantities cranes and other large portable and/or stationary engines.

WORK PRACTICE IMPROVEMENTS

- ♦ Do not “Top-Off” fuel tanks. This can increase the risk of spillage and excessive vapors or cause a vapor recovery system to become blocked.
- ♦ When possible, perform submerged filling of fuel tanks as opposed to splash filling when no vapor recovery system is in use. This will minimize VOC emissions.

PREVENTIVE MAINTENANCE

- ♦ For vapor recovery units, replace boots that have splits or tears.
- ♦ All fuel tanks and tank trucks should be on an inspection and preventative maintenance program to minimize the likelihood for tank and system failure

SPILL MANAGEMENT

- ♦ Use secondary containment equipment (spill pans, buckets, curbing, etc.) in areas with the possibility for leakage or spillage.
- ♦ Clean-up all accidental spills rapidly to minimize fuel evaporation and the likelihood that spills reach water pollution pathways.

FUEL STORAGE AND TRANSFER OPERATIONS (Cont.)

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

Gasoline/Diesel Pump Self Inspection Checklist

Inspect Gasoline/Diesel Pumps on a periodic basis identifying problems with an **X** and no problems with an **OK**.

Week of:

Inspection Points	Mon	Wed	Fri	
Hoses				No Kinks, Flat Spots, or Blockages
Boots				No Triangular Tears, Cuts, or Slits
Faceplates and Flexible Cones				Good Seal, No Missing Seals or Gaskets
Nozzle Shut-Off				No Shut-off Malfunction
Connections in Good Condition				No Leaks or Potential Detachment
Check Valves				Properly Wired and Clamped
Certified Equipment				No Missing Seals, Gaskets, or Stickers
Vapor Recovery Unit				Power On, Compressor Working
Secondary Containment and Clean-up Equipment				Containment and Spill Equipment In-Place
No Topping Off				Signs or Procedures Followed
Submerged Filling				When Possible
Overflow Protection				Containment
Usage Accounting				Fuel Usage Recordkeeping System Operational
Inspector's Initials				

NA = Use NA for areas that are Not Applicable to your operations

Note: What to do if a serious problem (leakage, tear, etc.) is identified:

- 1) Shut pump down and lock nozzle out of service.
- 2) Inform the Maintenance Department to repair the problem.
- 3) Inform the Environmental Department to follow up with Maintenance.

Also, all minor problems should be reported to the Environmental Department.

FUEL STORAGE AND TRANSFER OPERATIONS

(Cont.)

NOTES:

OBJECTIVE

To minimize the potential for spills and air emissions from wastewater collection, treatment, and storage operations.

SHIPYARD WASTEWATER TREATMENT

Shipyards generate, process and dispose of a variety of wastewater streams. Nearly all of these streams undergo collection, containment, treatment, and storage operations before they are discharged into either a receiving body of water or a municipal treatment plant for further treatment. Wastewater treatment operations can range from oil/water separation to full-scale chemical treatment processes. In a typical pretreatment facility, waste water is collected, equalized, and neutralized before it is discharged. Tanks are used for holding capacity when the chemical or physical properties of the waste water are altered by neutralization, biotreatment, or other treatments.

POTENTIAL EMISSIONS

During operations, wastewater is potentially exposed to the atmosphere and volatile organic compounds (VOCs) may be emitted. VOCs are emitted from wastewater through the volatilization of organic compounds at the liquid surface. Emissions can occur by diffusive and/or convective mechanisms. Diffusion occurs when organic concentrations at the water surface are much higher than ambient concentrations. Convection occurs when air flows over the water surface sweeping organic vapors from the water surface into the air. The rate of volatilization is related to the air flow over the water surface and temperature of the water.

Another important aspect of wastewater treatment is the minimization of spills that can potentially reach adjacent waters. These spills can cause serious environmental harm, cost the company money and delay production processes. Spills can also cause air pollution when spilled volatiles evaporate.

GOOD ENVIRONMENTAL PRACTICES

PREVENTIVE MAINTENANCE AND INSPECTIONS

- ♦ Develop a preventive maintenance program to ensure that all equipment is operating properly, especially equipment that has the potential for air or water releases. Always replace parts, connections and other equipment before failure occurs.

WASTEWATER TREATMENT UNITS

NOTES:

CRAFTING QUALITY ENVIRONMENTS THROUGH GOOD ENVIRONMENTAL PRACTICES

- ♦ Perform routine inspections of the treatment facility and check for leakage, proper practices, required containment equipment and other irregularities. It is always a good idea to create an inspection checklist form, to record the results of your inspections

WASTEWATER TREATMENT UNITS (Cont.)

CONTAINMENT & EQUIPMENT MODIFICATIONS

- ♦ Use covered tanks for the collection, treatment, and storage of wastewater. Keep covers in place when not in direct use.
- ♦ Utilize secondary containment facilities around wastewater treatment tanks and associated hose connections. This will reduce the likelihood of a spill reaching adjacent waters.
- ♦ Install overfill protection mechanisms and alarms as a safeguard against spillage. Procedures should not utilize overfill alarms as process indicators, they should be for emergency use only.
- ♦ If feasible and applicable, install air scrubbers or other types of air treatment systems on waste water treatment facilities when emissions become a problem.

NOTES:

OTHER WORK PRACTICE IMPROVEMENTS

- ♦ Keep all waste water treatment chemicals in a proper hazardous material storage area with all containers tightly closed. This will minimize releases and minimize the likelihood that accidental spills reach pollution pathways.
- ♦ Develop procedures that identify correct methods for wastewater transfer and treatment. The procedures should identify methods to avoid spills and minimize air releases.
- ♦ Always use mechanical agitation rather than aeration to mix chemical treatment compounds.

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